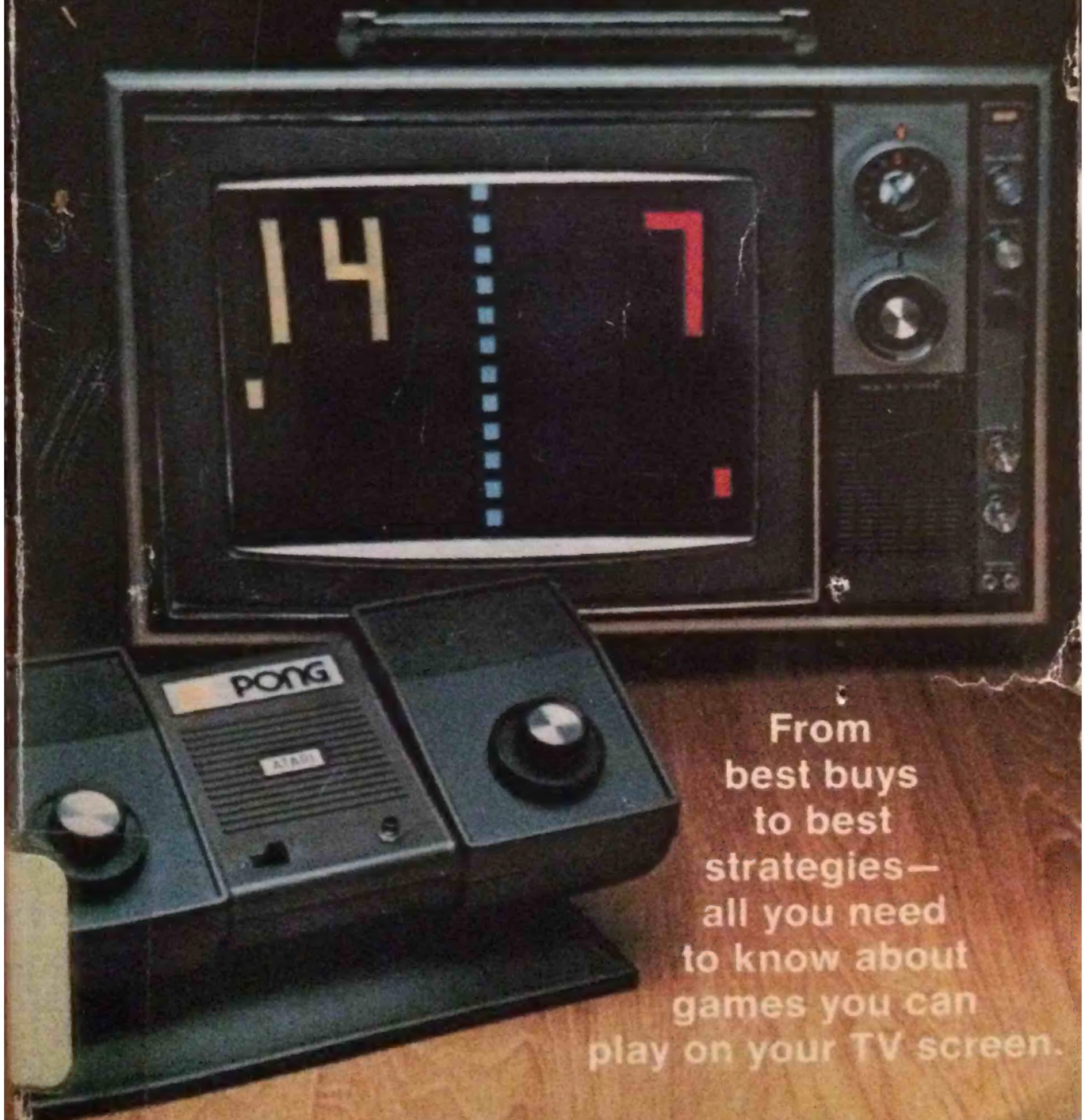
The Complete Book of VIDEO GAMES

by the Editors of Consumer Guide®

$1.75 84 449 WARNER BOOKS



From best buys to best strategies— all you need to know about games you can play on your TV screen.

BEFORE YOU BUY ANY TV GAMES
CONSULT

THE COMPLETE BOOK OF VIDEO GAMES

Learn the answers to questions such as these:

- Which games can be used on color TV?
- Can ball speed be changed?
- Can paddle size be changed?
- Can deflection angles be changed?
- Does real-life sound accompany video action?
- Is automatic-screen digital scoring available?
- How sturdy is the game?
- How can TV games improve my on-court timing?
- Are there psychological factors to use?

Check the relative ratings of the games you consider buying!

Consumer Guide® uses its testing facilities and experience to evaluate price, features and quality.

Explore the educational possibilities and discover how you can use the lessons you learn while you are having fun in action game competition in your own living room.

The Complete Book of Video Games

By The Editors of Consumer Guide®

WARNER BOOKS

A Warner Communications Company

WARNER BOOKS EDITION

ISBN 0-446-84449-3

Cover design by Gene Light

This Warner Books Edition is published by arrangement with Publications International, Ltd.

Warner Books, Inc., 75 Rockefeller Plaza,
New York, N.Y. 10019

A Warner Communications Company

Printed in the United States of America

Not associated with Warner Press, Inc. of Anderson, Indiana

First Printing: March, 1977

10 9 8 7 6 5 4 3 2 1

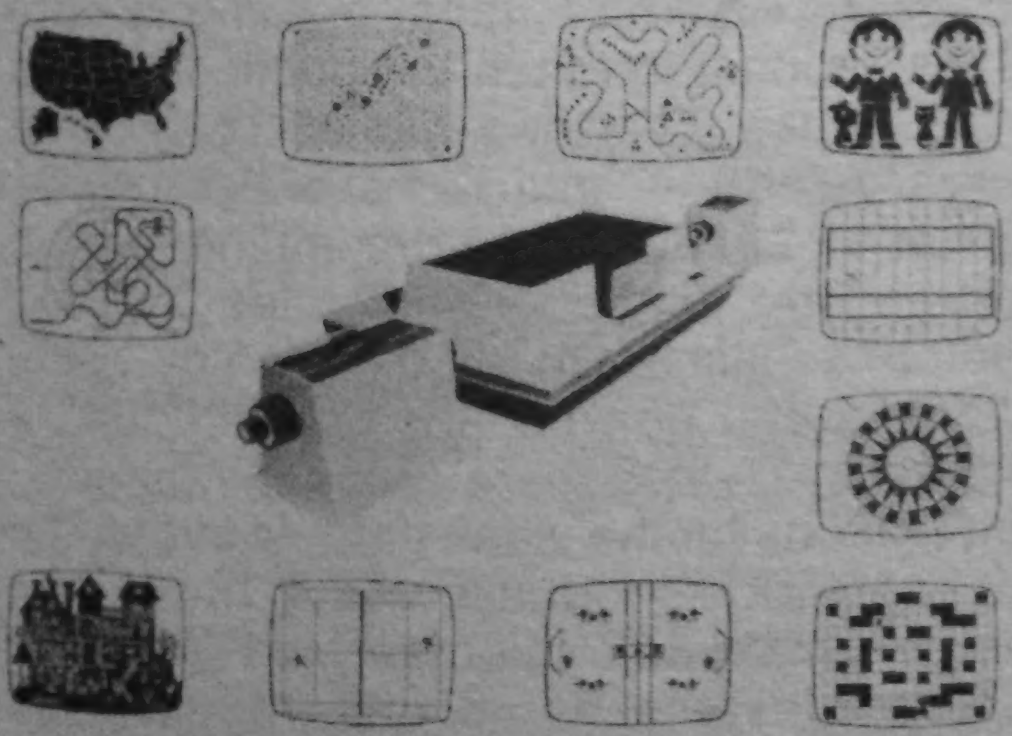
CONTENTS

It All Started With The Odyssey

THE NEWEST, most exciting leisure product to reach the public in years is the TV video game. Total 1976 sales are said to have been $150 million to $315 million, depending whose figures one accepts, and sales are expected to reach up to $750 million by 1985. These sales figures are not difficult to understand, since there are many compelling reasons for the video game's spectacular popularity — virtually every home has the necessary television set; the game offers wholesome home entertainment in which anyone of any age can participate; it provides thrilling action-packed competi-

tion; and, best of all, the video game is modestly priced (a virtue which will become ever more apparent in the future).

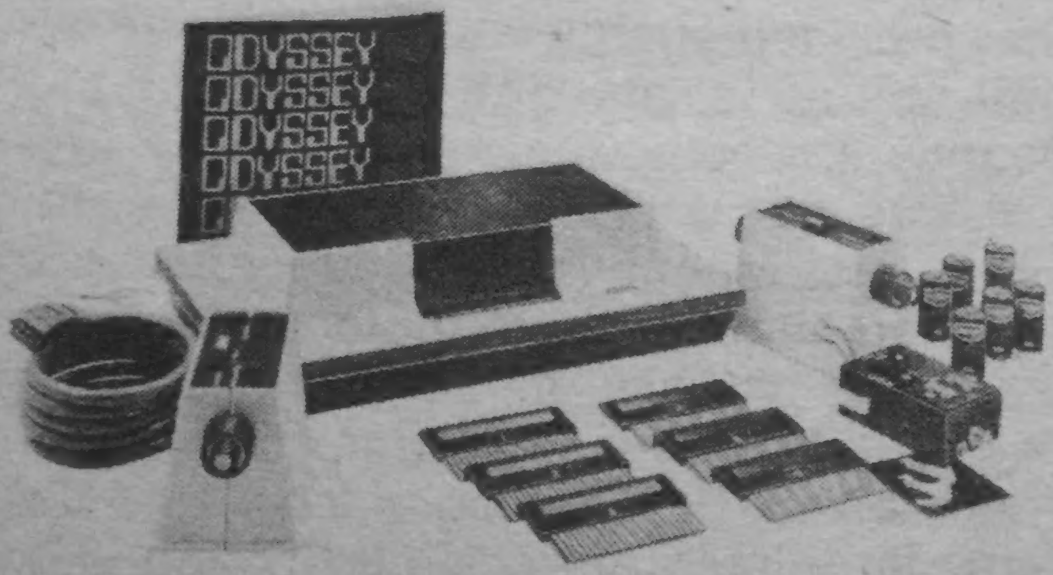
It all started in 1972 when the Magnavox Company introduced the first TV video game. Called Odyssey, it was only a very basic paddle game for two people, each of whom would try to hit a small moving square on the black-and-white TV screen by manipulating a control that moved the paddle up or down. The original Odyssey game required the owner to affix a plastic laminated sheet to the face of the TV set's picture tube in order to provide the outline of a playing field. Nevertheless, bolstered



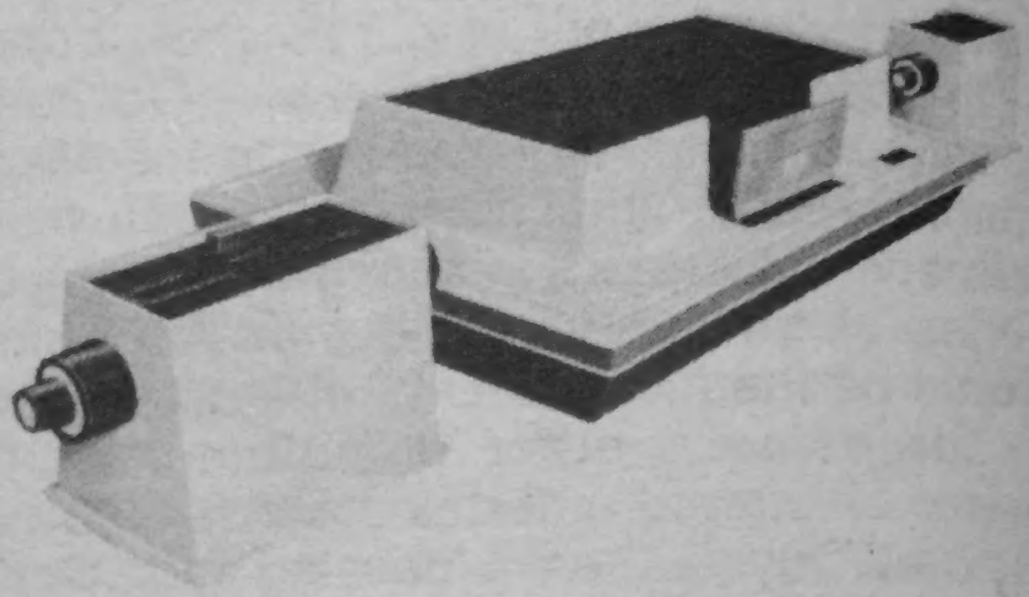
The original Magnavox Odyssey game required the owner to affix plastic sheets to the TV screen.

by Magnavox's national advertising and a ready-made network of public showrooms — the company's TV retailers — Odyssey became a successful addition to the Magnavox product line. Its name, taken from Homer's epic, refers to a long wandering or series of travels, implying that this game would be the forerunner of others.

Surprisingly, other manufacturers of home electronic entertainment equipment viewed Odyssey as a passing fad. Companies making public amusement devices (pinball machines, etc.), however, saw video games as a welcome addition, and with the introduction of these coin-operated games in amusement parks and restau-



The first Odyssey involved several components, but it produced only a very basic game.



The original Magnavox Odyssey game sold quite well in 1972.

rants, the concept became reinforced in the public's mind. The manufacturers who had been skeptical suddenly saw the profit potential and started to offer home units that provided such novelties as selectable ball-speed levels and adjustable ball-bounce angles.

It was not until 1976, however — four years after Magnavox introduced Odyssey — that a number of other electronics manufacturers actually marketed video games designed for use in the home. The true impetus for the burgeoning video game field came from integrated circuit (IC) manufacturers who developed devices designed to activate circuits for TV game playing. A small integrated circuit (about 1-1/2 by 1/2

by 1/20 of an inch) was created that incorporated circuitry for playing a number of games; digital on-screen automatic scoring; adjustable paddle size, bounce angles and ball speed; automatic or manual ball service; a variety of sounds; and visually defined areas for all ball games.

When working models were introduced and demonstrated at electronics trade shows in early 1976, IC manufacturers were overwhelmed with parts orders. Scores of companies entered the TV game field. Semiconductor manufacturers such as National Semiconductor, General Instrument, Fairchild Instrument, and MOS Technology hit pay dirt. More orders were placed than could be filled in time for the end of the 1976 Christmas buying season, and before the end of the year, General Instrument had sold its five millionth integrated video game circuit.

Unfortunately, the new business has already witnessed bankruptcies, obsoleted models, and delayed product delivery. Several manufacturers were unable to swing into full production with the latest IC's in time for Christmas 1976.

Compounding these production difficulties came a host of legal problems. For one, Magnavox charged many companies with patent infringement. But more distressing was the entrance of the federal government, pointing out that consumers

could not be allowed simply to attach a device to a TV set's antenna terminals that would provide in-house video signals. Since the game's signals could be transmitted through a TV set's antenna wire to the antenna and into the area where neighboring TV antennas would receive the game signals, the need for some regulation was obvious. Consequently, the Federal Communications Commission (FCC) established standards to prevent interference with other people's television reception.

If the game owner simply took a screwdriver and detached the wire or cable leading to the antenna, there would be no problem with interference. But the FCC does not trust people to detach the antenna lead wire from the terminals on the rear of the TV set every time they wish to play a TV video game. Instead, the FCC requires that the radio-frequency modulator section of the TV game — the circuitry that supplies the right TV signal to develop images on the screen — must carry FCC approval. Moreover, the agency tests every manufacturer's game to be sure that it conforms with the FCC requirements.

The company must submit a $1500 filing fee with each equipment-testing application. If the unit passes muster, an additional $500 must be paid within 45 days of approval (called "type approval"). All games must be type approved by the FCC,

Fairchild's Video Entertainment System is the leader in the microprocessor game format, which offers a theoretically unlimited number of contests.

a fact that is noted on a label at the bottom of every game. Should the video game unit fail the FCC tests, the $1500 is forfeited and the prospective manufacturer must start all over again. When resubmitting equipment that initially failed, the company pays a filing fee equivalent to 75 percent of the original testing charge.

Future Looks Bright

BUYERS ENJOY a wide choice of TV games at present, and the promise of many more types arriving in the near future will certainly be fulfilled. Owners quickly realize that TV games promote family togetherness, improve physical and mental reflexes, spark an interest in sports, and can even serve as a training tool for improving one's court game right in the home. In fact, it is entirely possible to practice a myriad of tactics on your TV screen and then transfer what you learn to real play.

The following chapters will help you make the best buying decision for your needs by giving you a candid look at TV games that are available now and a preview of those that will be marketed in the near future. In addition, you will learn about the strategy and tactics that separate winners and losers, how to transfer game proficiency to the real court, and the various accessory attachments that can make TV game playing even more fun.

TV Electronic Games Today

COMPETITION BETWEEN TV game manufacturers is fierce. Many of their products, in fact, are basically the same games, differing only in the way they are packaged. To some extent, this similarity is due to the small number of integrated circuits (IC) available, but even the same large-scale, mass-produced integrated circuits can be modified with optional circuitry to add more game variety. The AY-3-8500-1 device from General Instrument Corporation, for example, can take on additional small circuits to create a rifle-shooting game, to produce paddles and background in full color, to increase the number of players

from two to four, and so on. Since technology is not the true limiting factor, then, consumers must evaluate games on the basis of which offers the greatest degree of playing enjoyment vis-a-vis the selling price.

In weighing which TV game to purchase, ask yourself the following questions:

- How many games can be played?
- Will the games be produced in color or black-and-white? All games operate on color TV sets, but most produce only black-and-white video.
- How many players can participate at the same time?
- Can ball speed be changed?

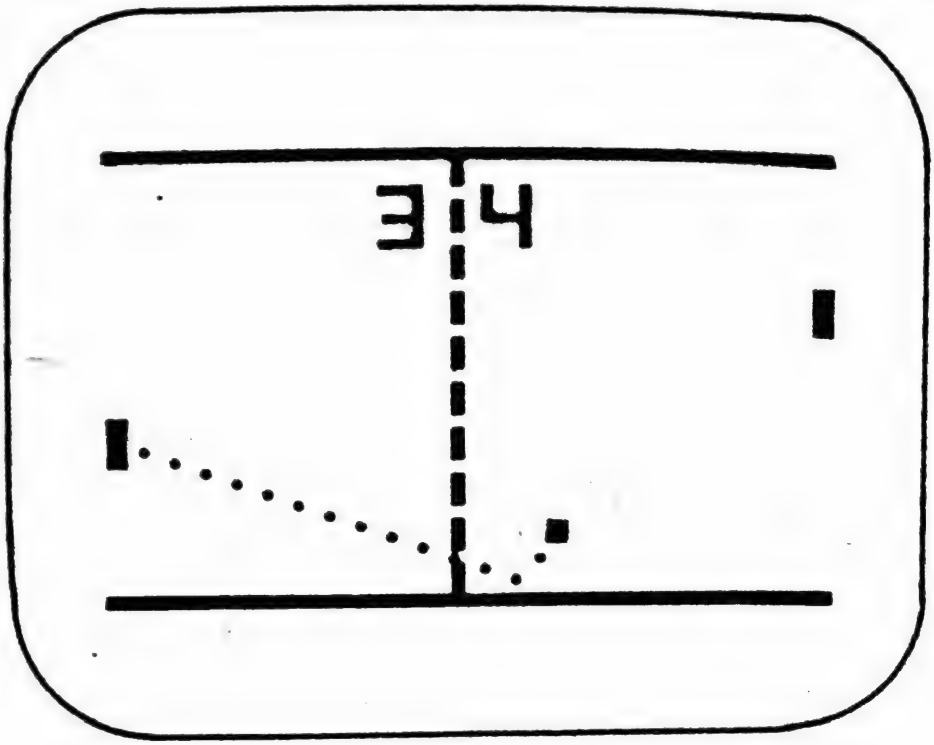
This tiny integrated circuit chip from General Instrument can produce several video game displays and can be modified to offer additional features.

- Do ball-return angles change?
- Does sound accompany the video?
- Is there a practice function so that one person can use the game to sharpen skills?
- Can the controls be operated via remote control?
- Can paddle size be changed?
- Does ball speed change automatically or can it be changed manually?
- If the latter, how many speeds are available and what are the speeds?

So you see, buying a TV game is not as simple as going into a store and laying down a credit card. If you want the best value for your money — i.e., a TV game that will not bore you after a brief period of time — you will have to think carefully about video game capabilities long before you make any purchasing decision.

The Games You Can Play

TENNIS. This simulated racquet game is endemic to most video games. In TV tennis the screen displays a vertical stripe down the center to denote the net. Simulated racquets or paddles (they look like rectangular objects) appear near the edges at each side of the TV screen. Near the top and bottom of the screen, in most cases, are the electronically generated court bor-



A vertical stripe down the center denotes the net in TV tennis. Simulated racquets appear near each side of the screen.

ders — either straight lines or a series of dashes or dots — stretched horizontally across the picture tube's face. In some cases there are no defined court boundaries, or else the boundaries are indicated by changes of color or a different shade of black. Even if the court lines are invisible, though, the side lines act as rebound walls, off of which the ball ricochets at various angles.

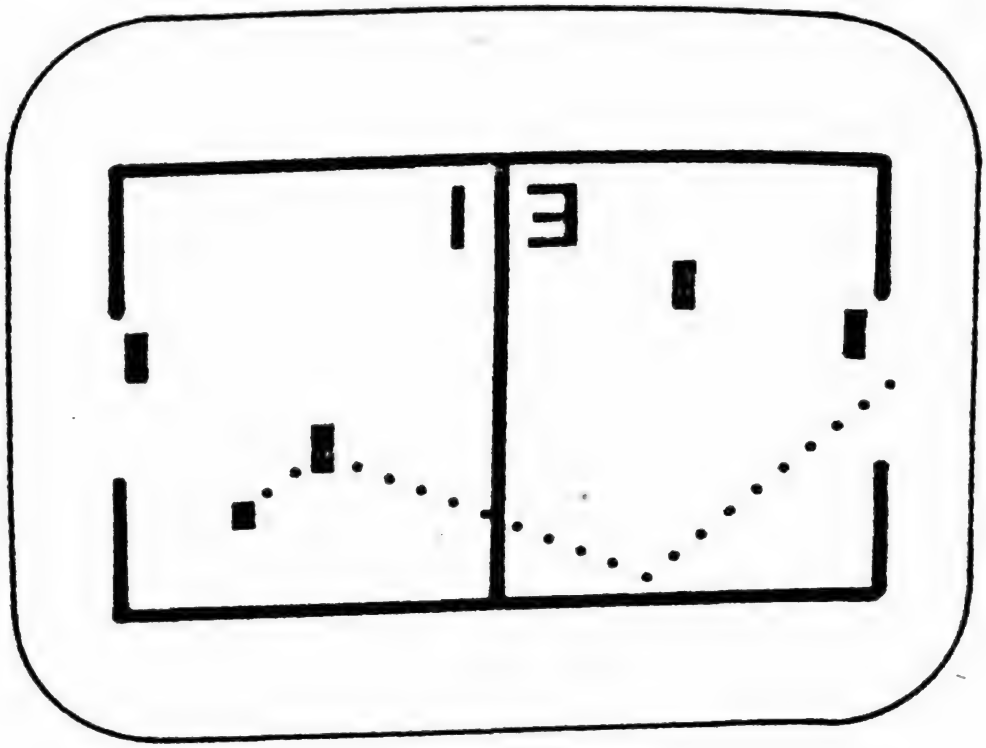
The make-believe racquets or paddles, generally one on each side, face the net. In most games of TV tennis, each player manipulates a control — sometimes a large knob, at other times a lever — to move the

respective paddle up or down on the face of the TV screen. With few exceptions, there is no provision for horizontal paddle movement. The purpose is to intercept and hit back to the opponent any ball that bounds into one's own playing zone. When a player misses a ball, a point for his opponent registers on the TV screen; the point totals generally appear in large numbers and then disappear. Usually, the player who first reaches 15 points wins the game.

At present, most TV games are constructed so that a reset button, which automatically reverts the score to 0/0, must be pressed before another game can be played. Until that reset button is pressed, the ball will continue to enter the field, but it will go right through any paddle it meets and no additional digital score will be registered on the screen.

HOCKEY. The second basic TV game is hockey, sometimes called soccer or football. All of these games are nearly the same, but hockey is the most appropriate name because the "puck" actually does rebound off the "walls" as it does in an actual hockey game.

When the hockey game is turned on, vertical goal lines appear at the extreme left and right of the TV screen, each having a center opening that is wider than the puck; the puck is the same square "ball" used in



Vertical goal lines appear at the extreme left and right of the screen during video hockey; the opening in each goal line is wider than the puck.

TV tennis. Often, there is an additional vertical line in the center of the screen to indicate each player's defense territory.

Each participant generally controls two "hockey sticks," which are usually identical to the rectangular-shaped racquets used for the tennis game. One stick is positioned right near the goal opening and the other is closer to the center line, although sometimes this forward stick is past the center line and into the opponent's half of the field. Both the forward and the goalkeeper sticks are normally operated by one control; they move up and down the screen in unison, as

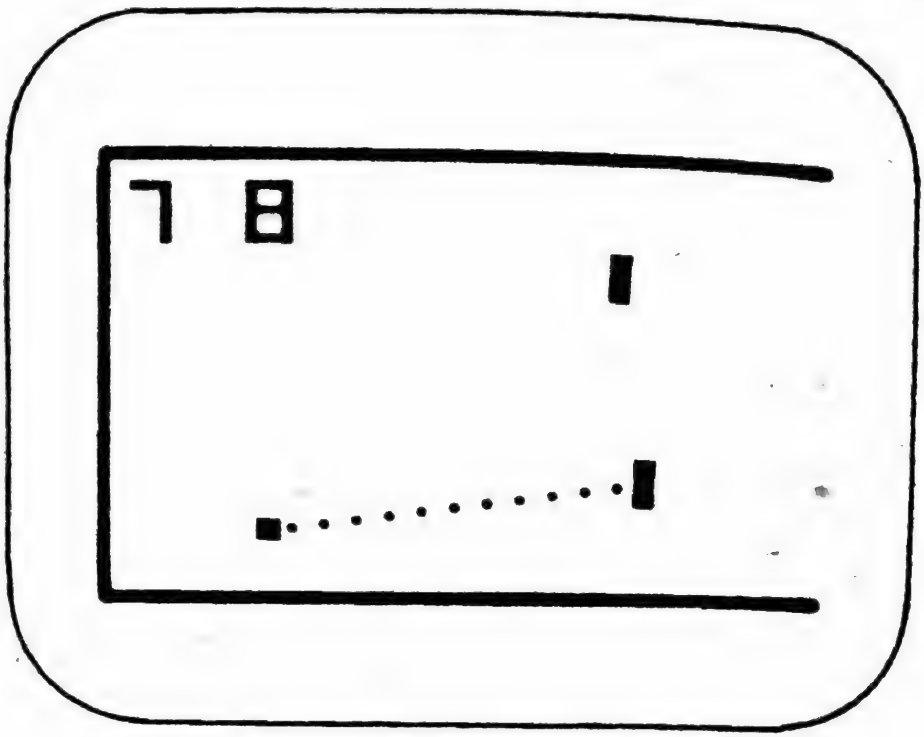
if connected to a single bar.

The puck automatically comes into play from either side of the screen and heads toward one of the goals. The defending forward can intercept the puck and drive it back toward the opponent's goal, but if the forward misses, the goalie has an opportunity to do the same thing. Should the goalie also miss and the puck enter the open (goal) area, a point is registered for the other team. The updated score automatically appears on the screen, disappears, and a new puck automatically comes into play — usually heading in the direction of the team that just lost the point. But even if the goalie misses, the puck could rebound off a wall and be directed back toward the other playing area.

In most games 15 points wins, although there are exceptions. And in at least one TV hockey game, the puck is not deflected when a stick intercepts it. Instead, the puck is held by the stick while the player tries to move it toward the opponent's goal.

SQUASH. In TV squash, a vertical wall generally appears at one side of screen; two racquets, almost in line with each other, appear elsewhere on the screen. TV squash is sometimes called handball or — when only one racquet is displayed — practice, pelota, robot, or some similar name.

When two players play TV squash, each



In TV squash, a vertical wall appears at one side of the screen; two racquets, almost in line with each other, appear elsewhere on the screen.

one must hit the ball on an alternate basis. The right-hand player (right control) generally goes first. Should the left-hand player intercept the ball at this point, the ball will go right through the racquet, thus ensuring that the proper turn is fully respected. When the player whose turn it is misses the ball, a point automatically registers for the opponent and the score automatically appears on screen.

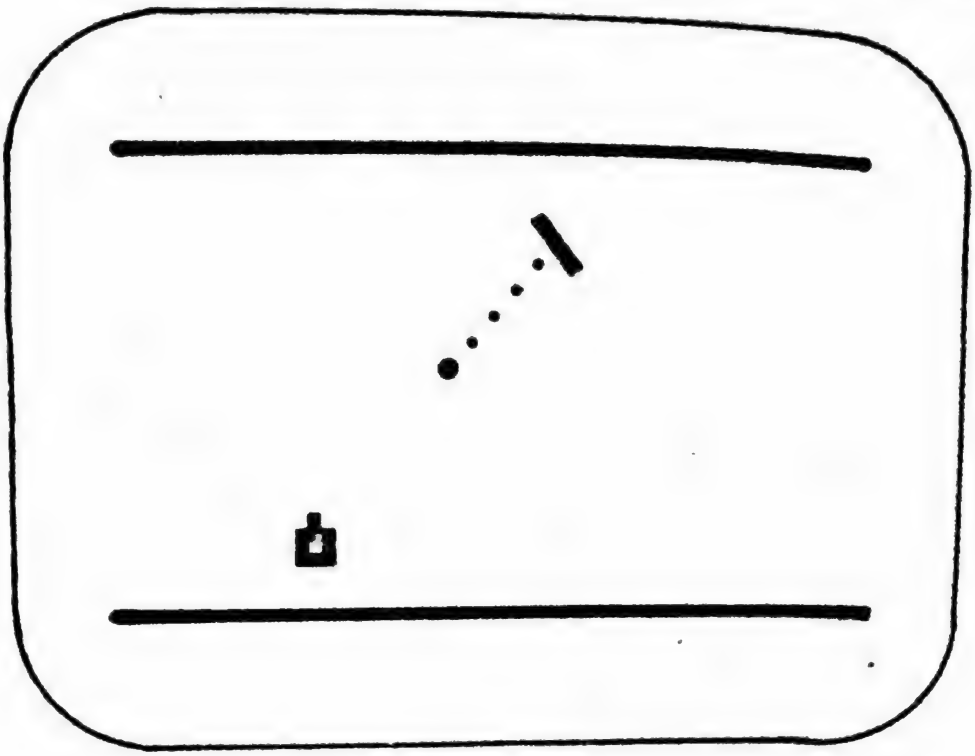
When one person plays practice, robot, etc., he or she continues to hit the ball rebound after rebound. When a miss occurs, the score appears. This might appear to be

foolish, since the ball is sure to be missed eventually and thus the machine will always win 15 to 0 (if that is the score limit), but there are ways that game manufacturers have devised to make this format meaningful.

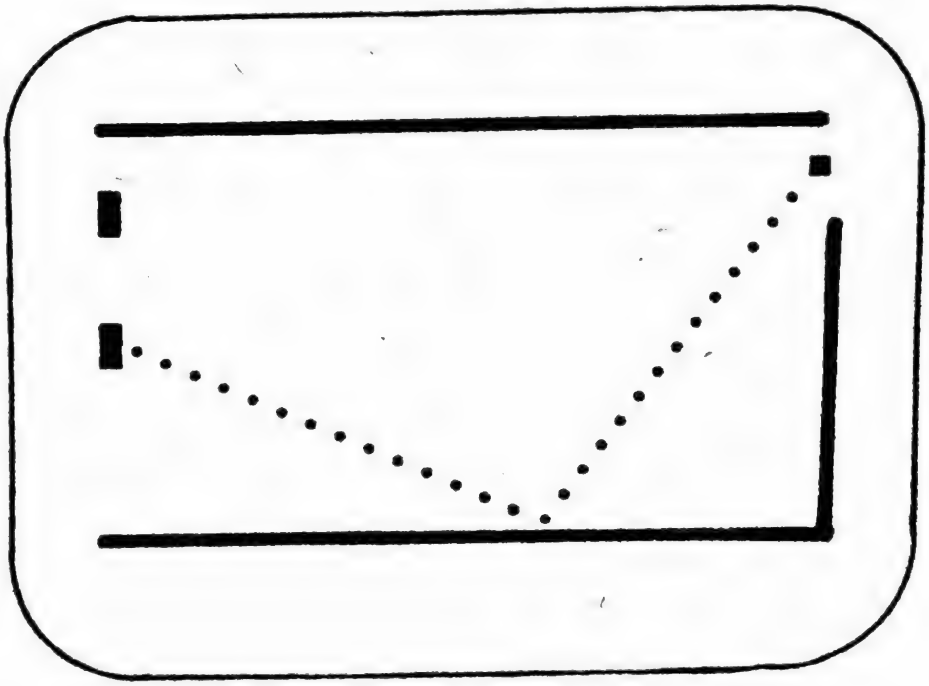
TARGET SHOOTING. Unlike tennis, hockey, squash, etc., TV target shooting requires the use of external toy pistols or rifles. The target, usually the same ball or puck as in other TV games, bounces randomly on the TV screen. When the player pulls the trigger and scores a hit, the target is blanked out. Usually, the number of hits a player scores is registered on the TV screen following 15 shots.

An alternative shooting game features a target that moves across the screen without bouncing around. If the target goes off screen unscathed or if the shooter misses before hitting the target, score one for the machine. This TV game is sometimes called skeet shooting.

BASKETBALL. Although similar to TV squash, TV basketball is different in that the height of the single wall can be adjusted so that an opening at the top exists. The size of the opening depends on how the players adjust the wall height. The object of the game is to hit the ball through this opening. If missed, the ball rebounds



When a player pulls the trigger in shooting games and scores a hit, the target disappears from the screen.

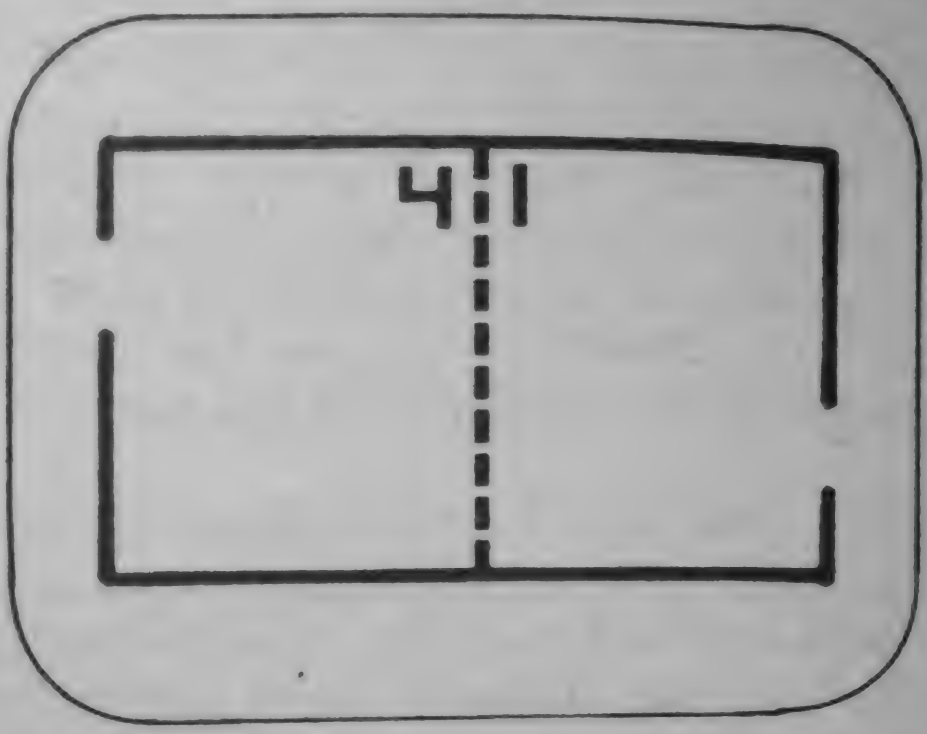


The size of the basketball opening is adjustable to accommodate various levels of playing ability.

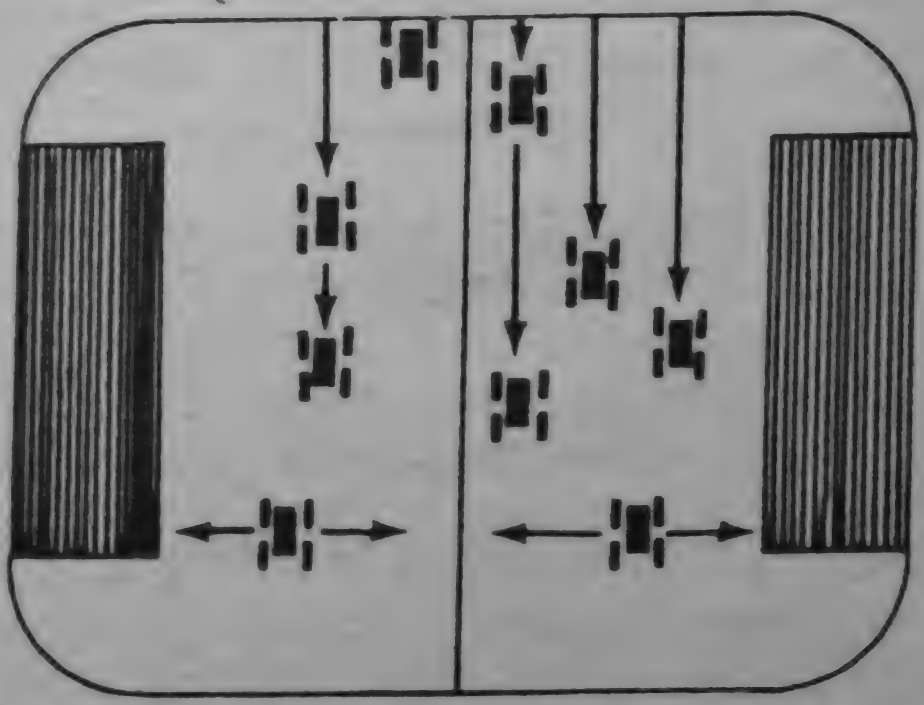
off the wall or side court lines and returns toward the opposite end of the court. If missed by the player's paddle, the ball goes off screen and the opponent (whether the machine or another player) wins the point. If the player sends the ball through the opening, he or she wins the point.

CATCH. The field for catch is set up as in hockey, with openings at each end to simulate goal areas. There are no sticks or racquets, however. Instead, each player controls the vertical position of one of the goal openings, moving the opening up or down in order to "catch" the ball or puck. A successful catch is made when the ball passes through the opening. Until then, the ball will continually rebound off the walls. A catch, of course, earns the successful player one point.

AUTO RACING. Simulated stock car racing automobiles appear on the TV screen, moving randomly from top to bottom at increasing speeds. Each player controls a single automobile and moves it horizontally along the bottom part of the TV screen in order to avoid a collision with oncoming cars. When a collision occurs, there is a flash and an audible beep, while a point is registered against the driver. The race then starts again until a driver has the maximum number of points registered against him.



The goal openings in catch can be moved vertically to snare the ball. Scores occur when the ball passes through the goal openings.



The object in video auto racing is to avoid collisions by moving a car horizontally out of the path of vertically onrushing stock cars.

For two or more players to compete, it is necessary either to maintain a count of the number of cars that a player avoided or to keep track of the time that a player was able to steer clear of oncoming cars.

Variations On The Basic Games

MANUFACTURERS OF video games are constantly trying to add variations to the basic games to make their products more challenging. Most of the variations involve the addition of small electronic circuits to the basic IC that forms the heart of the game. Each of these smaller circuits, naturally, raises the cost of producing the game and, therefore, the price consumers must pay for it. But since these variations enhance the fun potential and the skill development of players, many people are willing to pay for more and more complex video game machines.

Among the most popular features is the one that enables players to change the size of the paddles. Obviously, it is more difficult to hit a ball or puck with a small paddle than with a large one. Some games allow as many as three size changes: normal (large size), intermediate (half of normal size), and small (half the intermediate size). Other games offer only two paddle sizes, and, of course, the less costly units have only one size — the large size — paddle.

Another function that can be incorporated into a TV game is change of ball speed. When this feature is included, players generally can choose between normal speed and high speed, the latter being about twice as fast as the former. Since some players lack the necessary physical/mental reflex facilities to respond well to fast balls, this feature can make an enormous difference in who wins and who loses.

Some TV games are designed so that the speed of the ball automatically increases after a few exchanges back and forth. Players do not control these speed changes.

The angle at which the ball ricochets off a wall can sometimes be modified, too. There are, for example, games that give players the option of a 20-degree angle or a 40-degree angle. Some games, in fact, include a button so that each player can select a different angle at specific times in order to fool an opponent. A sharper angle is sometimes called "English."

Typically, the section of the paddle on which the ball makes contact determines the angle at which the ball bounces off. The section nearest the center of the paddle will hit the ball at a 90-degree angle, that is, in a straight horizontal direction. When ball contact is made closer to the top or bottom of the paddle, the angle at which the ball

bounces is sharper. There are a total of four angles at which the ball will rebound off the paddle, including the straight horizontal direction. Of course, the direction that the ball rebounds has nothing to do with the angle at which it meets the paddle. What determines the angle of rebound is the section of the paddle that intersects the ball.

With games that provide automatic speed-up of the ball's travel, the rebound angle automatically becomes shallower; in fact, only two angles occur when ball speed is increased. Some games feature three automatic ball speed-ups, each one reducing the angle at which the ball bounces off the paddle. Accordingly, there is not much difference in the rebound whether the ball strikes the center portion of the paddle or toward either end of the paddle when ball speed is at its greatest.

Magnavox even includes (on some models) a ball-travel control that permits players to send the ball across the TV screen in different directions. Moreover, some of these models have provisions for horizontal movement of paddles as well as vertical movement across the face of the TV screen. Horizontal paddle movement is, of course, more difficult for players to handle, but it certainly is truer to real sports games.

Remote controls are now being included

with some video games, enabling players to compete more comfortably, instead of having to rub shoulders as they bunch over a game box. Remote controls can take the form of levers or resemble the round controls found on any radio or TV receiver.

Sound effects, naturally, enhance playing enjoyment, and many TV games issue two or three differently pitched sounds to aurally indicate a ball entering a playing field, a wall bounce, paddle bounce, etc. Other games have explosive-like sounds, motor rumblings, and so forth, depending on the game functions involved. Sound is generally produced internally, but some games use the TV set's audio system.

Very few TV games display paddles, walls, etc., in full color. The majority can produce black-and-white action games on either monochrome or color TV receivers, leading many buyers to infer that the game's video is shown in a variety of different colors. A game that actually offers full color, however, costs considerably more than those that merely "play on color TV."

Another optional choice in features is the manual-serve function. Having manual control of the serve in addition to the automatic ball serve adds excitement since opponents never know when the ball will be served.

Game packaging is important to many

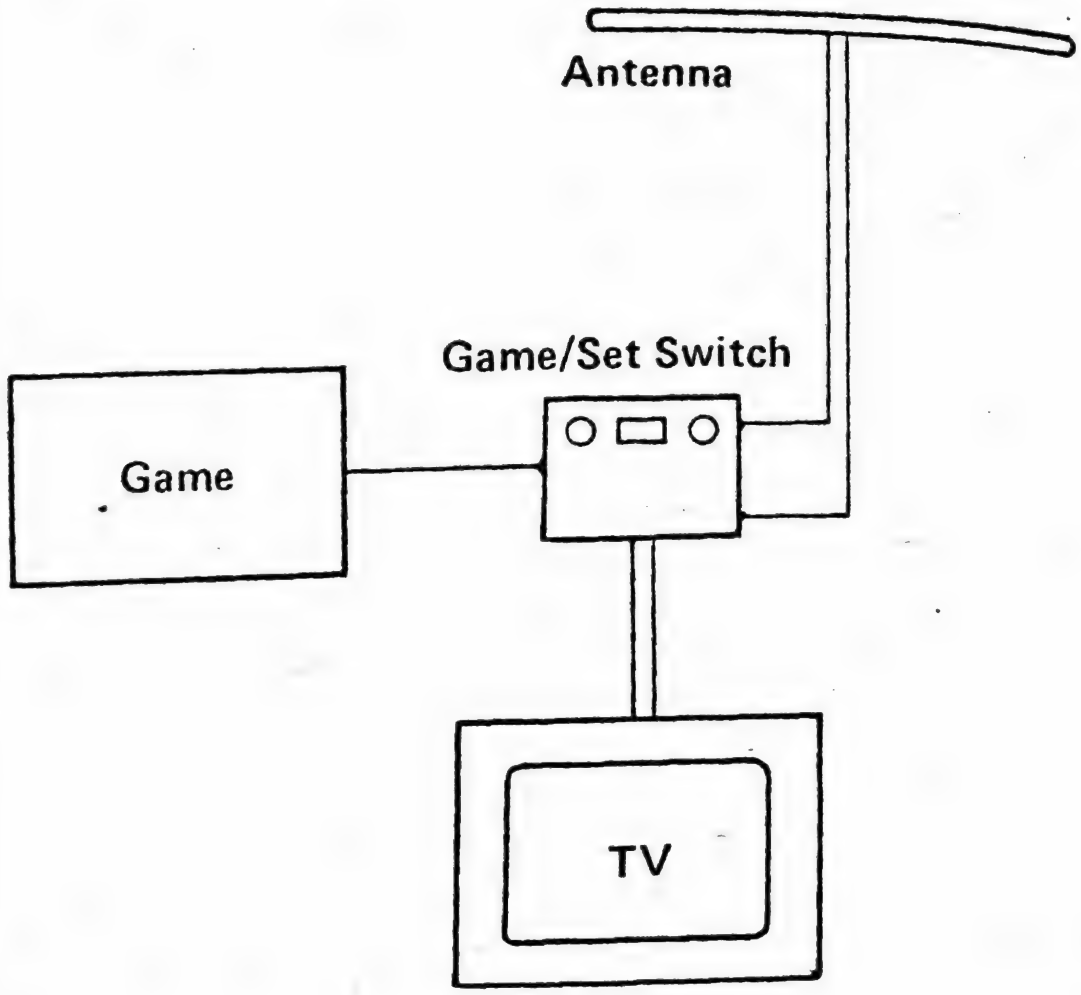
people. Some games are obviously made to keep production costs at a minimum, with inexpensive walnut-grained paper pasted on a panel. Others are very attractive, with handsome molded cases, offset sections for player separation, imitation-wood (plastic) grilles, etc.

TV games are changing constantly, with prices rising for each new innovation supplied. Already a new generation of games has reached the marketplace, priced higher than their simpler predecessors.

It is worth remembering, however, that video games still represent a relatively new consumer market. Do not be surprised, therefore, to see companies who cannot successfully compete in the market for one reason or another experience financial troubles and quickly fade away.

The Game/Set Transfer Switch

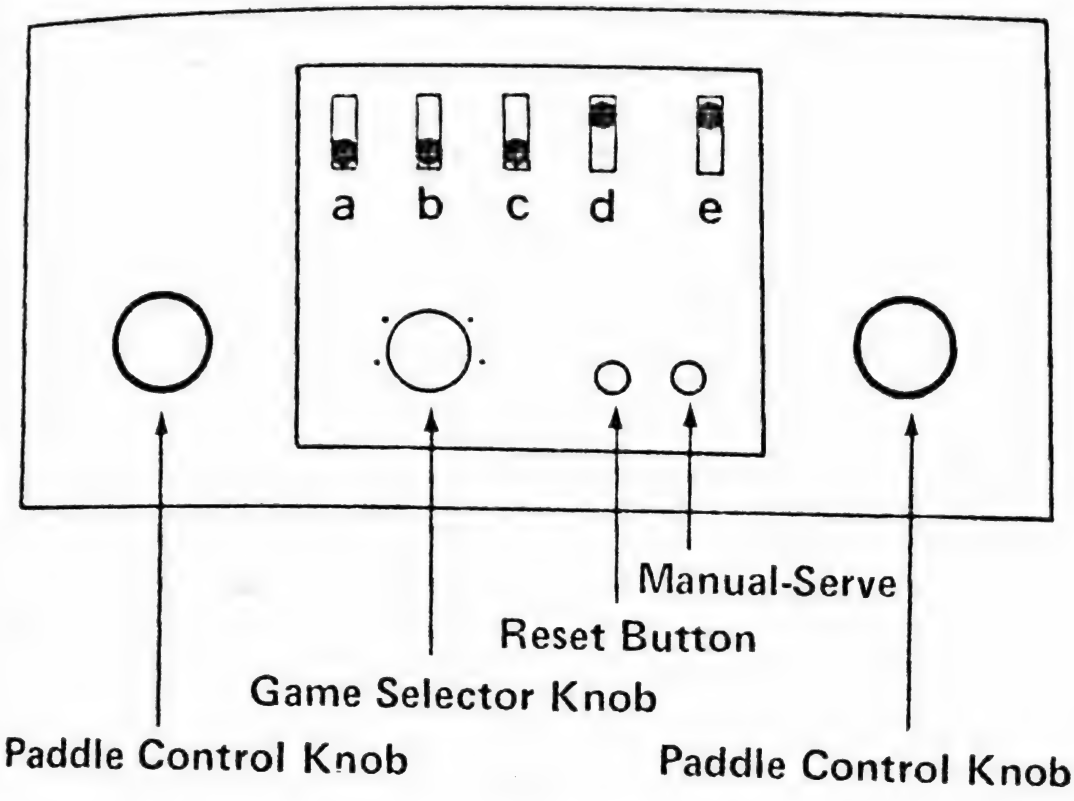
ALL TV GAMES come with a transfer switch device, a basic requirement that the FCC imposes on Class I TV devices (the category in which video games fall). The transfer switch usually consists of a small box with a game/set slide switch, a phono jack input connection that accepts a long cable coming from the TV game, two screw-on antenna terminals for the TV set's antenna leads, and a short length of TV antenna wire that attaches to the an-



The game/set transfer device allows the viewer to switch from a regular TV broadcast to a video game display without removing the antenna wire from the TV's antenna terminals.

tenna terminals on the back of the TV set. When the transfer switch is properly installed, a user can switch from viewing a TV broadcast to playing a TV game without removing the antenna wire from the TV set's antenna terminals.

The switch is not an ordinary one, though. It is designed to make certain that



After you attach the game/set switch, turn on the TV, move the switch into the game position, turn on the power, adjust the various control options, and press the reset button to start the action.
a=*Power On/Off* **b**=*Ball Speed* **c**=*Paddle Size*
d=*Rebound Angle* **e**=*Auto/Manual Serve*

the signal from the video game never interferes with reception of a regular TV broadcast. An acceptable Class I TV device switch must also provide reasonable assurance of maintaining its specifications for at least five years under normal operation. Separate switches are available; Sears Roebuck, Magnavox, and Atari dealers sell them, primarily for use with second TV sets.

TV games are designed to operate on an unused channel. Most often that is channel 3. Usually, however, there is a switch so that the game may be changed for use on channel 4 should channel 3 be in use.

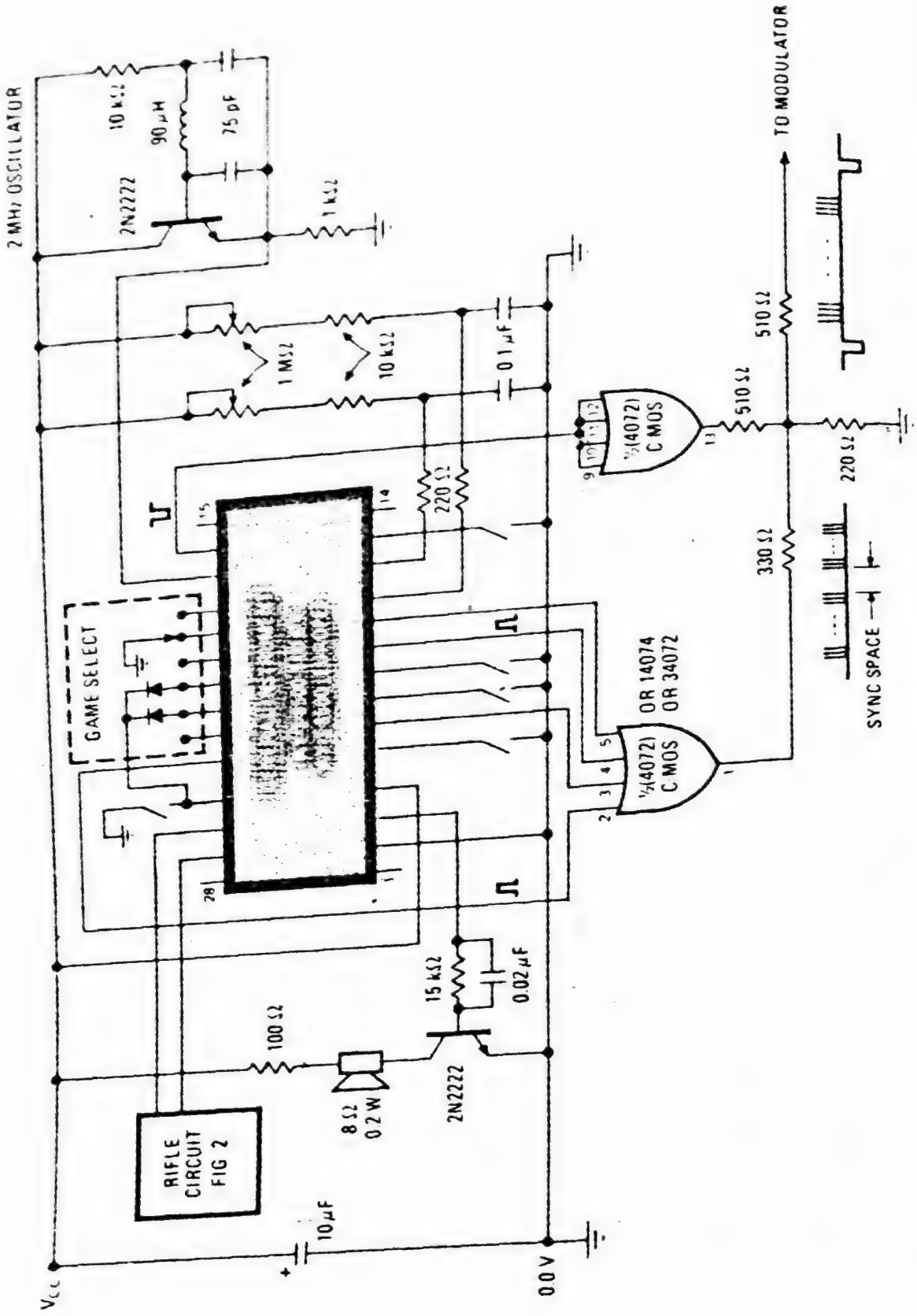
Here is how to start play with the typical video game. Turn on the TV set, slide the switch box attached to the set's antenna terminals to "TV Game." Select channel 3 (or channel 4 if channel 3 is a broadcast channel in the area). Turn the game power switch on. Press a reset button on the unit, and the particular game you have will be activated. For best visual results, you may have to lower the TV set's brightness; sometimes the set's vertical or horizontal control must be adjusted as well.

Naturally, you must either have batteries ("C" cells or "D" cells) installed in the game or an AC adapter attached and plugged into a standard electrical socket. The adapter is an inexpensive and thoroughly worthwhile option.

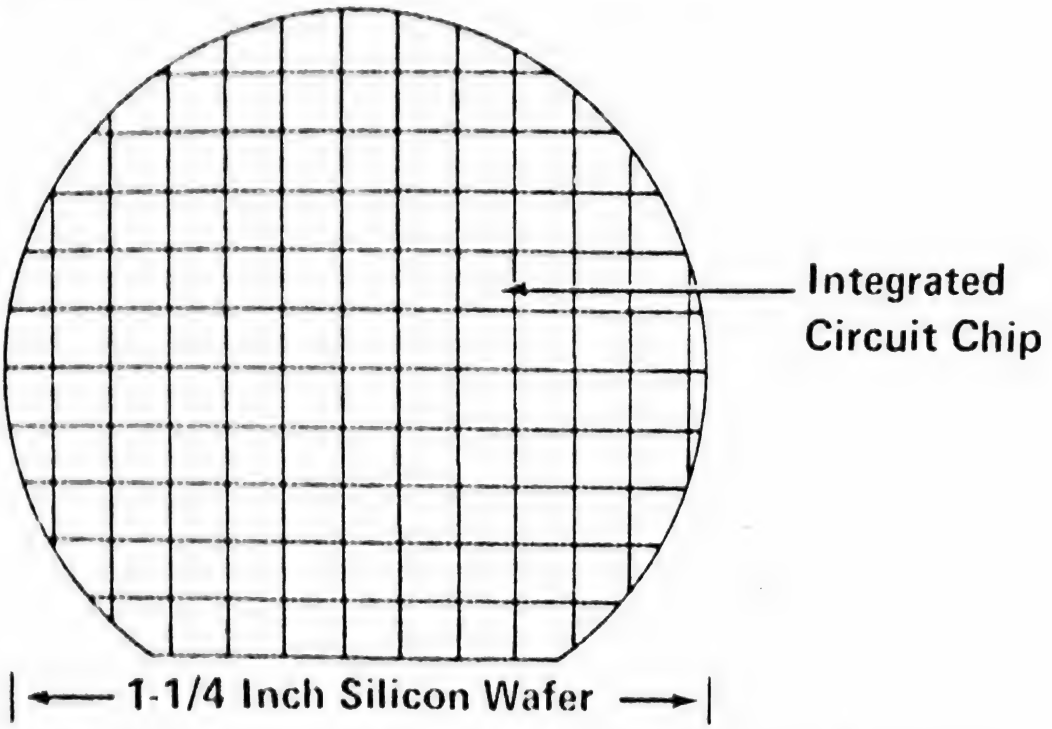
The Technical Side of Video Games

THE ELECTRONICS technology that has made possible the development of consumer video games has come a long way since Magnavox first introduced its Odyssey game in 1972. The original Odyssey contained about 305 individual electronic parts, did not produce a game field on the screen, and did not provide electronic scoring. It took three years and the incorporation of integrated circuits to make these refinements possible. The IC reduced the parts count to about 200 components. Later, "large-scale" IC's lowered the parts count even further (to about 75 electronic components), increased the number of game refinements, and cut the production costs — and, therefore, the prices consumers must pay — for the more sophisticated video games.

An integrated circuit is actually a micro-



Schematic diagram displays typical video game utilizing General Instrument AY-3-8500 chip.

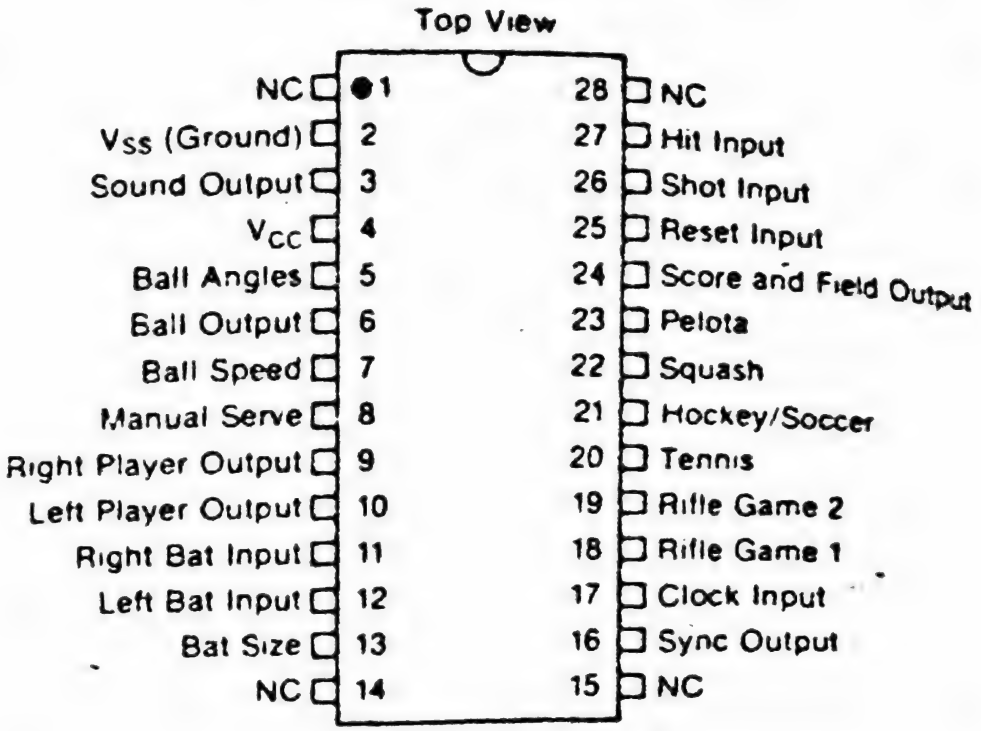


A large number of little (1/20 of an inch) chips can be produced on a single silicon wafer; each chip is identical to every other one on the wafer. The wafer is sliced, and each chip is mounted into a package and hermetically sealed.

electronics part that combines a great many components — resistors, capacitors, transistors, and diodes — into a tiny silicon wafer. It is not unusual, for example, to have the equivalent of a few hundred components compressed into a thin chip of silicon that measures only 1/20th of an inch square.

A large number of these little chips are produced on a single silicon wafer, each a duplicate of the other. For example, 150 circuits could be produced on a circular wafer of silicon at the same time, after which they would be sliced into individual

PIN CONFIGURATION
28-Lead Dual Inline



External leads are often aligned on both sides of a small rectangular dual inline package (DIP).

circuit chips, mounted into a package where connections would be made to external leads, and the package then hermetically sealed.

How can so much be crowded into so little space? The IC is produced through photographic and chemical processes; it starts large and is reduced photographically to a very small size. This is followed by a series of oxidizing, oxide removal, and diffusion processes, concluding with a final photomask operation for selective etching where the circuit inputs, outputs, and power supply contacts will be made. Thin

wires are connected to these contact pads and fastened to leads that project from a protective package. These leads, designed to plug into holes on a printed circuit board, are often aligned on both sides of a small rectangular object called a dual inline package (DIP).

Production of integrated circuits is actually quite inexpensive, excluding the costs of amortizing production equipment and the design and preparation of the photomasks. Of course, only large-scale production makes the whole process economically feasible. Producing a group of circuits on the IC chip — called large-scale integration or just plain LSI — further reduces the parts count and the cost, although some flexibility is lost compared to a multichip system.

Digital Electronics

IT DOUBTLESSLY boggles the minds of most people that electronic circuits seem to think. How is it possible for an electronic circuit to move balls, change angles, maintain numerical scoring, and so on, within so limited a physical package? The answer lies largely in digital electronics, a technology that is quite unlike anything commonly found in TV sets or radios or other more familiar consumer electronic devices.

Digital electronic circuits carry out logical

moves and make decisions based on these moves. All that is really involved is a simple system based essentially on whether a device is on or off or has a certain voltage or a lower voltage. This might also be called a true-or-false system or a logic 1 or logic 0 system because only two electronic states are employed. Due to the great speed with which electrons move, these decisions and consequent actions happen so fast that the human mind cannot perceive the system at work.

The foregoing two-digit, or base-2, system is called the binary system. Each digit, 1 or 0, is called a "bit," the name derived from the term "binary digit." In contrast, the counting system most people use every day is the decimal or base-10 system, using digits 0 through 9 to count from 1 to 10.

The word "digit," from the Latin word "digitus," means finger. Early Romans, in fact, developed Roman numerals by relating them to their fingers. A fundamental binary numbering system, the basis of digital electronic circuit operation, consists of successively doubled number values applied to each finger. Start with the thumb, which represents 1; the forefinger represents 2; the middle finger 4; the ring finger 8; the "pinkie" 16. On the other hand, the thumb represents 32, and so on. This is called the 8, 4, 2, 1 binary code.

I

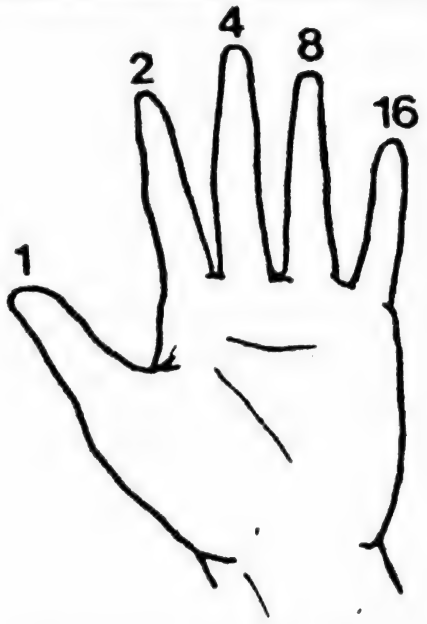
II

III

IIII IV

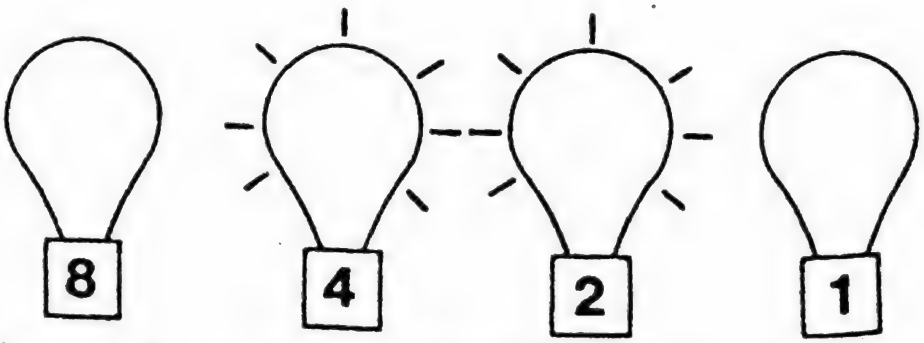
V

The word digit (from the Latin word digitus) means finger. Early Romans, in fact, developed what we refer to as Roman numerals by relating numerical values to their fingers.



A fundamental binary numbering system consists of successively doubled values applied to each finger.

With this code, decimal system numbers can be represented by a series of 0's and 1's or on's and off's. For example, if one wished to represent the number 3 with this code, the thumb and forefinger of the first hand would be raised — binary numbers 2 + 1 = 3 — while the others would be



Electric light bulbs arranged according to a binary numbering system represent how the number six can be derived. The binary expression of six is 0110.

clenched. Electrically (switch "on" or "off"), this finger equation would be represented by: 0 0 0 1 1. Think of it as a switch that is first on for a short time, another that is on for the same time, and the remaining switches off.

The following represents the expression of numerical values in the decimal system:

Binary	Decimal
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9

To add two separate numbers, say, 2 + 3, in the binary system, one would do the following:

0 + 0 = 0
0 + 1 = 1
1 + 0 = 1
1 + 1 = 0 carrying a 1 to the next significant digit

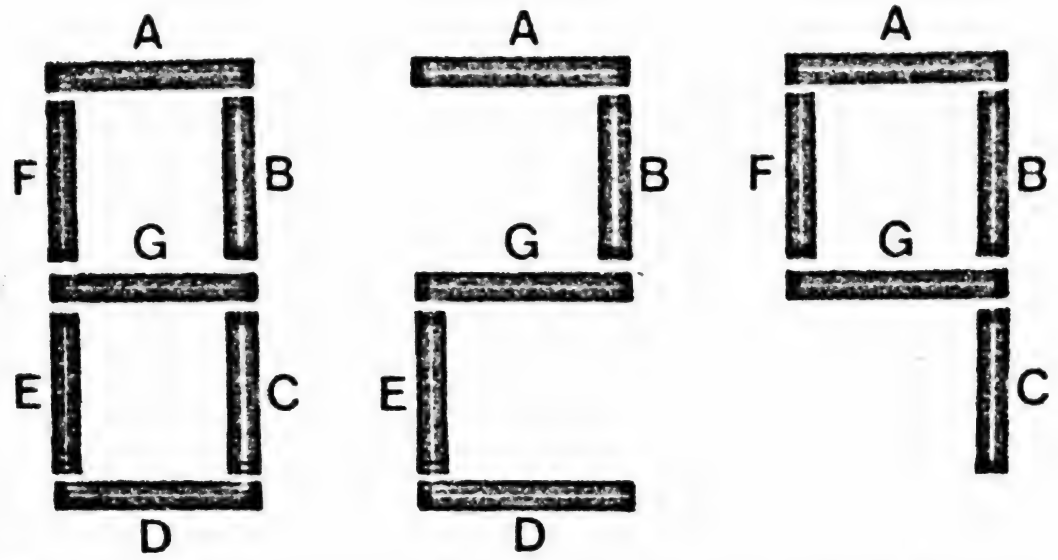
Therefore,

```
  0010   (decimal number 2)
    +
  0011   (decimal number 3)
  ----
  0101   (decimal number 5)
```

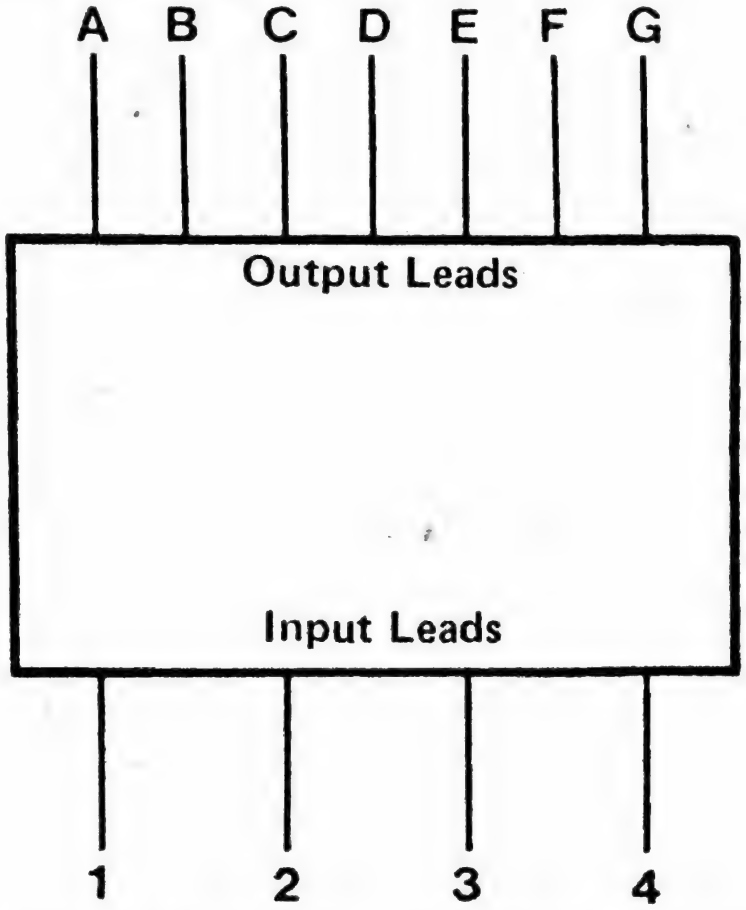
Note that 0101 is indeed equivalent to the decimal number 5, as indicated in the table previously shown.

A decoder is utilized in digital electronics to convert binary numbers to decimal numbers for a visual numerics display. A BCD (binary coded decimal) code is often used. The equivalent BCD number to a decimal number is the same as in the binary code previously discussed, except that it only goes (in digits) from 0 to 9. Consequently, the decimal number 15 would be 1111 in binary, but it would be 0001 0101 using the BCD code.

The BCD code uses four bits to represent numbers, using the finger-counting 8, 4, 2, 1 system. Such a system can be used very easily to display numbers graphically. With just a segmented number 8, any number from 0 to 9 can be produced by merely adding or removing a segment (on or off, depending upon the electronic signal received). Each segment is given a letter, with a total of seven letters employed. This same principle is used to dis-



A segmented number 8 can display any digit from 0 to 9 by merely adding or removing a segment. Each segment is given a letter, with a total of seven letters employed.



SEVEN-SEGMENT DECODE DEVICE

play numbers on electronic calculators; if you look closely at a calculator's unlighted readout, you will see a darkened figure 8. Similarly, the digital score you see on the TV screen when playing an electronic video game is always squarish in shape. There are various codes used in digital electronics, but the BCD code is a simple, economical one that is widely employed.

Logic

THROUGH USE of the on-off concept, electronic circuits can be made, in effect, to think and make decisions. Called "digital logic," this thinking/decision-making process is based on a true or false premise developed by George Boole in 1854. It is sometimes referred to as Boolean logic or algebra, and its concepts have been transferred to electronics because two contrasting conditions are easy to obtain. Again, true (or switch on) can be represented by the binary 1, while the converse can be represented by the binary 0.

The thinking/decision function is implemented by electronic devices called "gates." They are called that because that is just how they perform. Open the gate and electrons flow; close it and the electron flow stops. In effect, these gates are switches that respond to certain voltages in order to perform certain tasks. Gates are

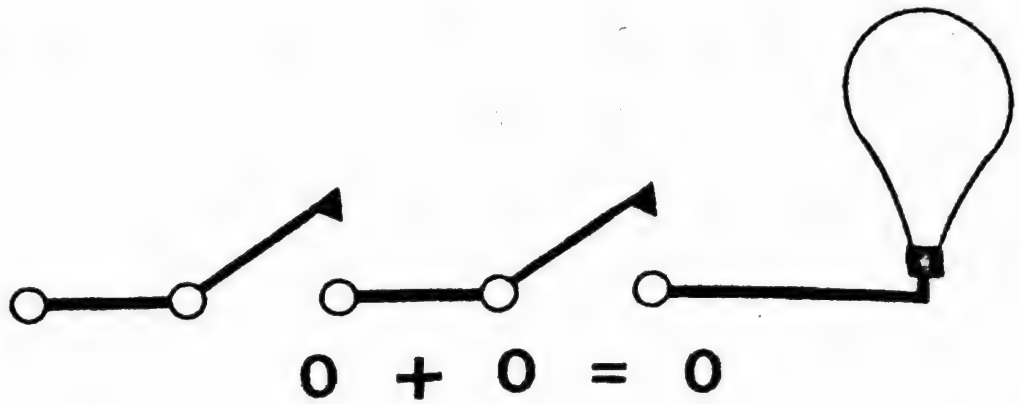
divided into three basic types: the AND gate, the OR gate, and the NOT (or inverter) gate. Three variations — called NAND, NOR, and EXCLUSIVE OR — are often used in digital logic circuits.

View these gates strictly from the perspective of their input and output leads. Although many gates are often combined, yielding a number of input and output leads, you can get an idea of how they perform by examining a single, simple gate.

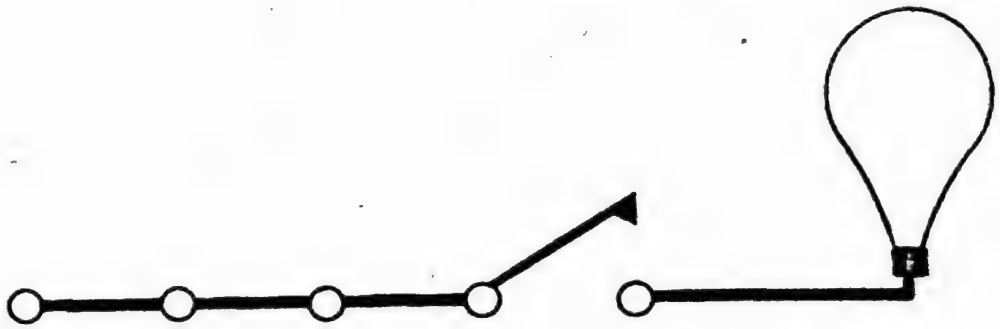
An AND gate is an electronic device with two input leads and one output lead. If each input receives a logic 1 (this could be voltage versus absence of voltage, the latter being logic 0 — or a high voltage versus a low voltage), then the output is a logic 1. If either input has a logic 0 while the other has a logic 1, or if both have logic 0, then the output of the AND gate would be logic 0. The only time it becomes logic 1 is when both input leads receive logic 1 signals.

In contrast, an OR gate will produce a logic 1 if either or both of its input leads receive a logic 1 signal. Therefore, if one input gets a logic 0 and the other a logic 1, the output will be a logic 1. Only when there are no logic 1's in the input — that is, when both input leads are at logic 0 — will the output of an OR gate be logic 0.

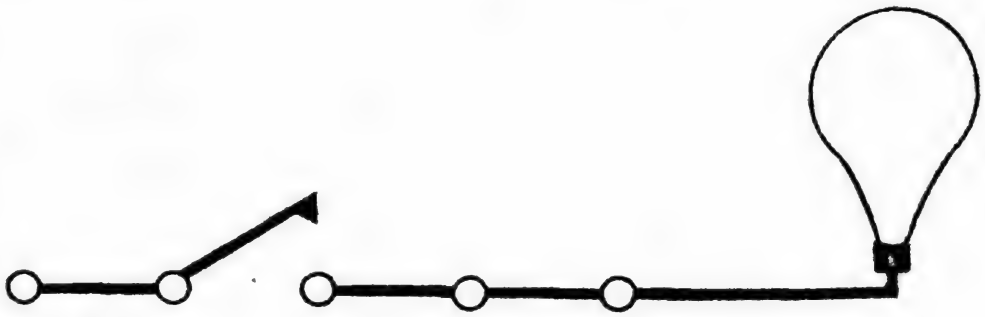
The third basic gate element, the inverter or NOT gate, has only one input. It is a contrary gate since it does just the opposite



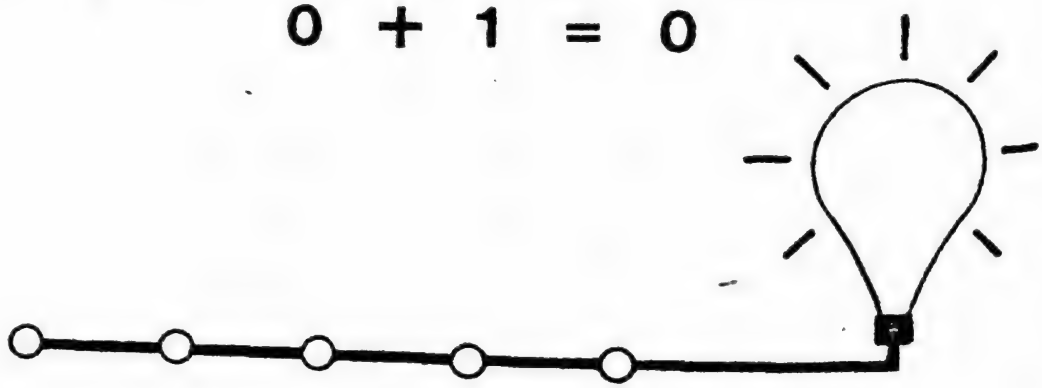
0 + 0 = 0



1 + 0 = 0



0 + 1 = 0



1 + 1 = 1

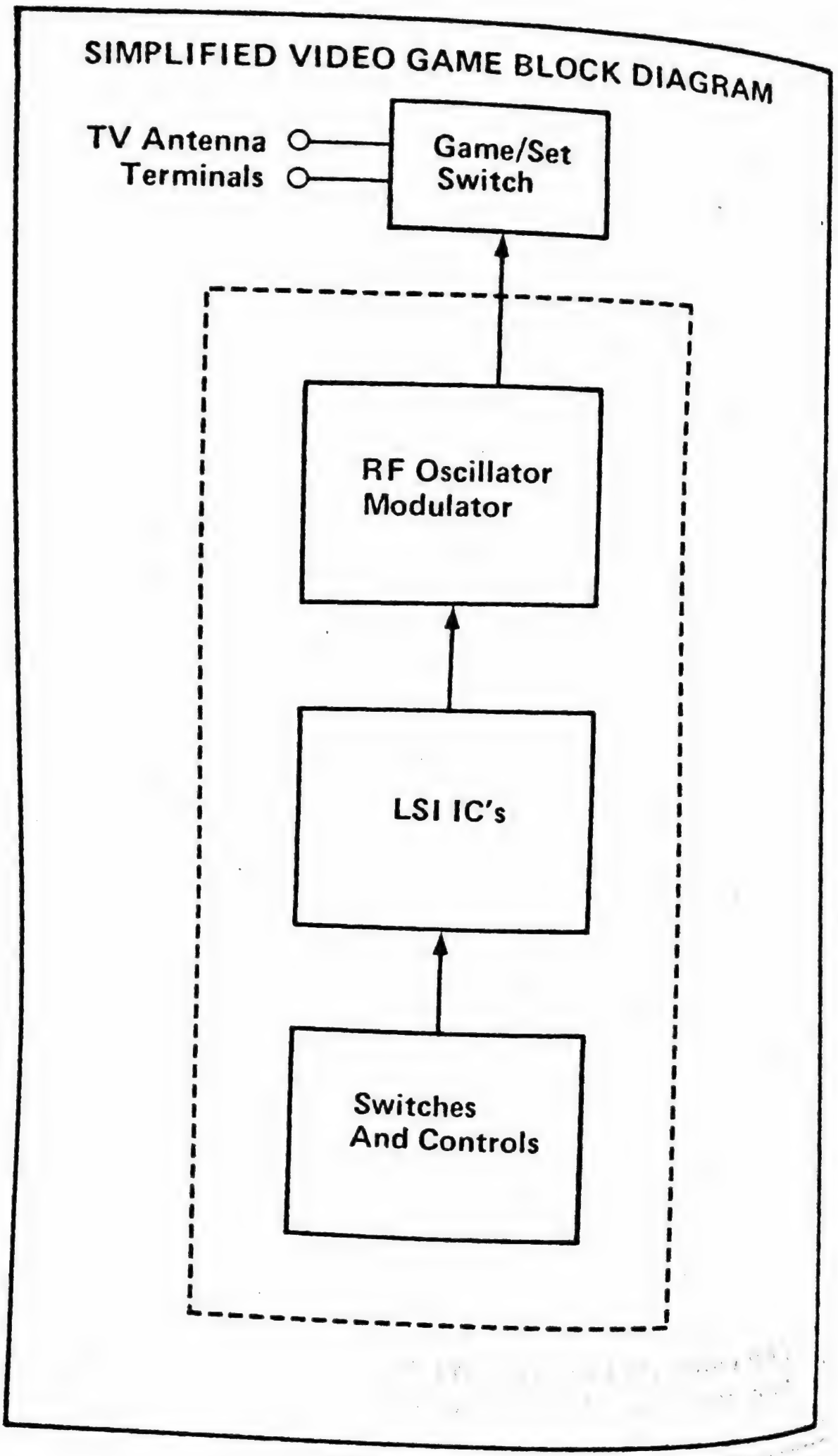
An AND gate is an electronic device with two input leads and one output lead. If each input receives a logic 1, then the output is a logic 1. If either or both inputs receive logic 0, then output is logic 0.

of what is fed into it. For example, if a logic 0 enters the input, the inverter's output will be logic 1, and vice versa.

To understand just how an electronic gate can function, suppose that the local traffic commissioner decides that when a number of cars approach a red traffic light after passing one that is green, the red light automatically should turn green to keep the flow of automobiles steady. This can be done easily with an AND gate. Simply feed the green-light signal from the previous traffic light to one input of the AND gate and the signal from an oncoming traffic detector to the other AND gate input. Then, the output will send a signal to the second traffic light so that it will turn green only when both conditions — i.e., previous green light and sufficient traffic volume — exist.

Video Game Electronics

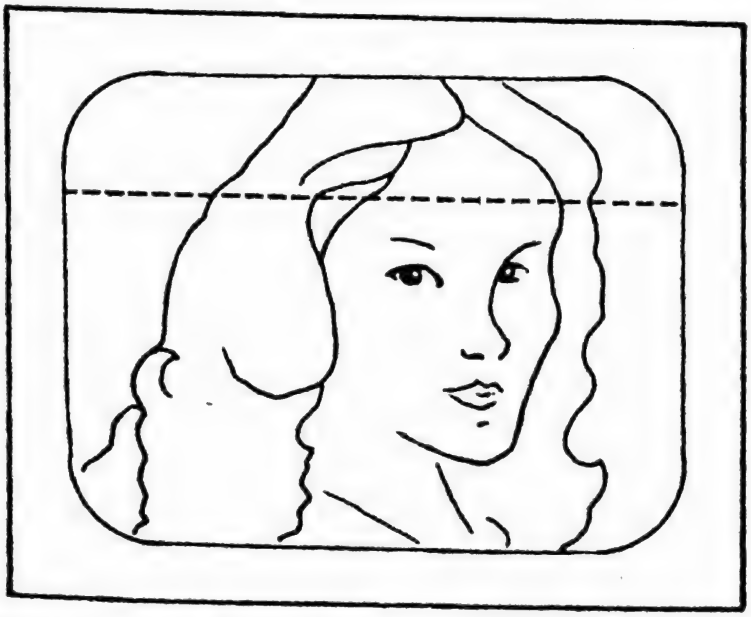
VIDEO GAMES ARE divided into only a few basic blocks. These include input controls (switches, potentiometer controls, etc.), video generators (paddles, balls, playing field, scoring), logic generation, and power supply. When everything operates correctly, a radio-frequency signal with intelligence can be applied to the antenna terminals of a TV receiver. An FCC-approved switch then disconnects the conventional TV antenna, substitutes the TV


SIMPLIFIED VIDEO GAME BLOCK DIAGRAM
TV Antenna Terminals
Game/Set Switch
RF Oscillator Modulator
LSI IC's
Switches And Controls

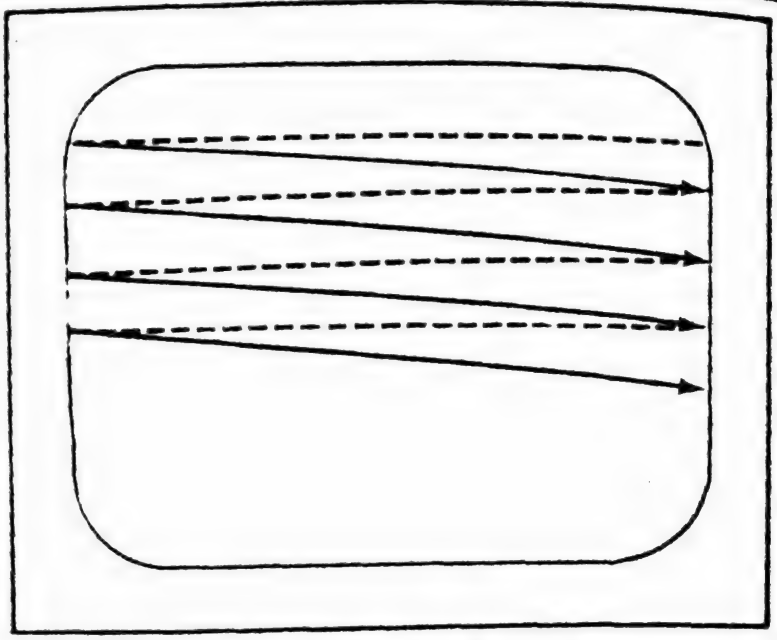
game signal, and you are ready to play some type of animated sports game.

The video picture itself is produced by a method called scanning. Simply put, this is a method in which the video is "painted" on a TV picture tube by a modulated electronic beam going back and forth diagonally, starting at the top. When it reaches the bottom, it starts over, going in between the first set of scan lines. Think of the beam, then, as bouncing diagonally from one side to the other.

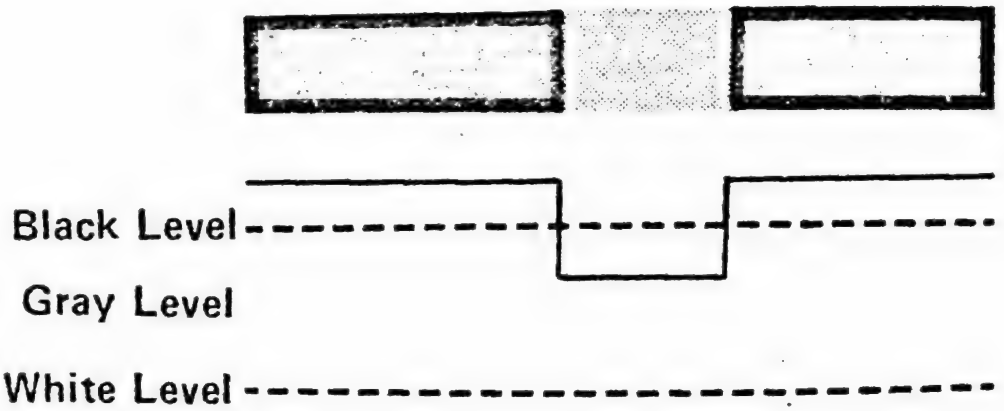
The video modulation signal itself is simply an electrical voltage that causes black to be displayed when voltage is high and white when current is low. Shades of gray are caused by voltage values in between high and low. The voltage variations



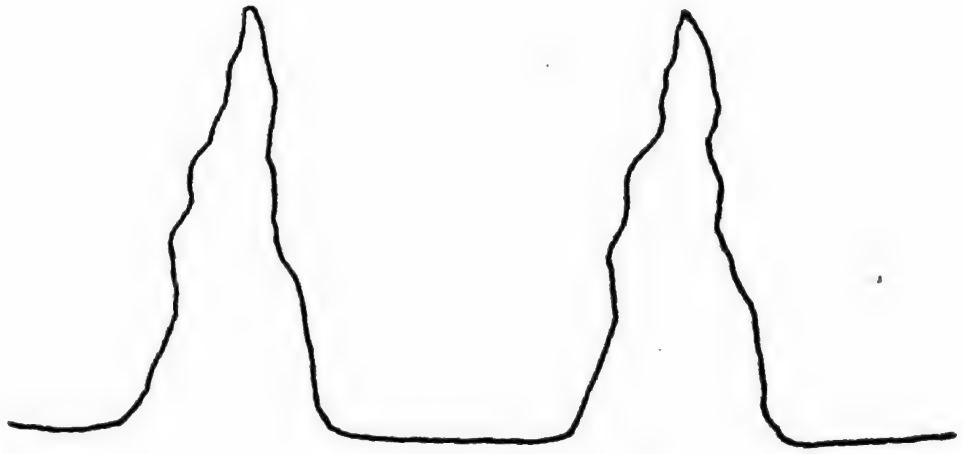
The video picture itself is produced by a scanning line which paints the picture on the screen.



Modulated electronic scanning beam bounces back and forth diagonally and then retraces (dash lines).



Gray is developed by variations in the electrical voltage of the video modulation signal.



Black is displayed when voltage is high, and white when voltage is low. Shading is created by voltage values in between high and low.

traverse across the screen so fast that the human eye cannot catch the motion.

Normally, 525 scanned lines make up a TV picture. This is called an interlacing system, with 262-1/2 lines repeated twice to provide a fine, sharp picture. For consumer TV video games, however, only 262-1/2 lines are scanned; that is done in order to reduce the amount of digital electronic logic required to keep track of where balls and players are at any particular moment. The picture quality produced by a video game does not suffer in comparison to the full 525 lines.

A popular Odyssey model utilizes nine LSI custom integrated circuits to produce a versatile video game. The first IC contains the rebound circuitry, wall generator, horizontal and vertical sync generator, and a regulated power supply. The wall generator makes wide use of digital logic devices, especially AND and NOT gates. Two more IC's maintain walls (with or without holes), a ball generator, and two player generators. Another IC incorporates the logic and video summer circuitry, with the former determining what is to happen when a paddle hits a ball (including ball direction and control transfer to another player). This circuitry also dictates when a ball is to be served. A few OR gates are used for the video presentation. Another IC provides scoring, keeping proper count and reset-

VIDEO GAME MULTI-CHIP ARRANGEMENT
Sound
Digital Logic
TV Antenna Terminals
Paddles, Walls, Scoring
Game/Set Switch
Ball Rebound
Video Summer
RF Oscillator Modulator
Horizontal/ Vertical Sync

ting to zero, while yet another displays the proper score automatically. IC's 7 and 8 are character generators and drivers. The final IC is for generation of a composite color video signal. Magnavox also makes a video game with a single LSI integrated circuit.

There are two types of sound that can be generated for a video game. One type, generated by square waves, is used to denote, aurally, when a ball hits a paddle or rebounds from a wall. In this case, the sound's pitch is altered simply by changing the digital pulse width of the square wave. The other sounds are the explosions, the roar of a stock car racer, etc. This kind of sound is costly to create and is, therefore, not yet widely used in games aimed at the consumer market, although commercial coin-operated games have utilized such sound effects with dramatic results.

Another interesting aspect of consumer versus commercial video games is the sharpness or resolution of the objects on the video screen. The difference is in the type of logic used. Whereas the consumer games get only one or two Megahertz bandwidth, there are commercial games that operate at seven MHz. To achieve these fine images, of course, makers of commercial video games must use more costly electronic logic devices.

The Advent Of Microprocessors

TO PROVIDE MUCH more in the way of entertaining video games, manufacturers are investigating the microprocessor system. A microprocessor unit (MPU), formerly called a central processing unit (CPU), is the brains of the computer. It is an arithmetic and logic function control device that resembles an integrated circuit except that it is a little larger. When produced in volume, MPU's are not much more costly than integrated circuits, although consumers will have to pay $150 to $200 for microprocessor games as compared to the $40 to $100 range of non-MPU TV games. MPU-based games can be used for educational purposes as well as competitive ones, and they can create complex games that could never be produced economically at this time with non-MPU technology.

The Fairchild Video Entertainment System is one microprocessor video game that is already on the market. The "Desert Fox" game, one of the many games that can be played with the Fairchild system, involves a tank that has to be rotated, accelerated, decelerated, and blown up; cannon shell motion is exhibited, and mine explosions are depicted. Movement is smooth because moving blocks of data generate par-

Fairchild's Desert Fox game involves rotatable tanks. Movement is smooth because moving blocks of data generate partial shifts in an overlapping manner. Since the tank is shifted more at the top than at the bottom, some distortion occurs.

Rapid switching of light to dark simulates a mine explosion or a cannon shell hit from opposing tank.

tial shifts in an overlapping manner. It all happens so quickly that the human eye cannot perceive the overlap; if it were not

handled this way, motion would appear to be jerky.

Suppose that a player using the Fairchild microprocessor-controlled game wishes to rotate a battle tank. The microprocessor would receive the signal generated by the player's hand control. With this signal, the microprocessor would update or refresh the tank pattern once every six or ten TV frames (in a TV frame, the picture is repeated 60 times per second to avoid flicker), shifting the image more at the top than at the bottom. A 25-degree turn command would move or update the tank's position once vertically and twice horizontally every six or seven frames, thus distorting the tank's picture. The process takes some getting used to, but people who play Fairchild's Desert Fox quickly become accustomed to how the game behaves and how they can control that behavior.

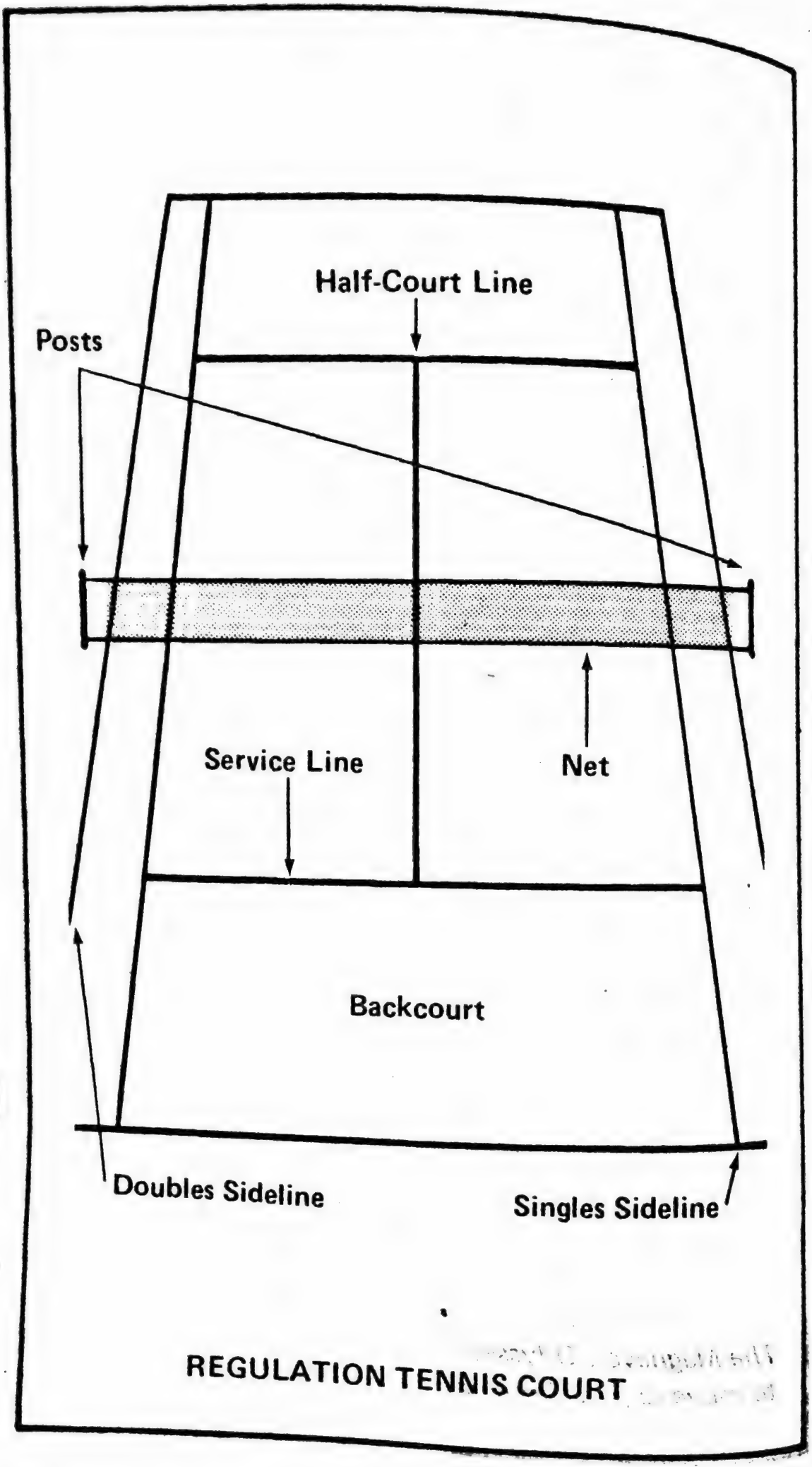
Microprocessor games use ROM's (Read-Only Memories), which are integrated-circuit memories from which information can be read out. The ROM's, programmed by the manufacturer, can be plugged in to set up a different game or games. Thus, the microprocessor video devices will offer nearly a limitless selection of games; the only real limit, in fact, will be the number of different games any single consumer can afford to purchase.

Game Strategy And Tactics

THERE ARE MANY ways to get an edge on your opponent when playing any kind of game. TV games are no exception. You must refine your basic skills, of course, but you must also master game strategy and tactics if you want to be a winner. Much of what separates winners and losers is psychological; you have got to be match-tough to be #1.

No Love In TV Tennis

COMPARE THE actual game of tennis with the video game. They appear very much different. In TV tennis there is no "Love .... 15 .... deuce, etc." Instead, the winner is the first to achieve 15 points (sometimes 21 or even 9 points, depending on the game

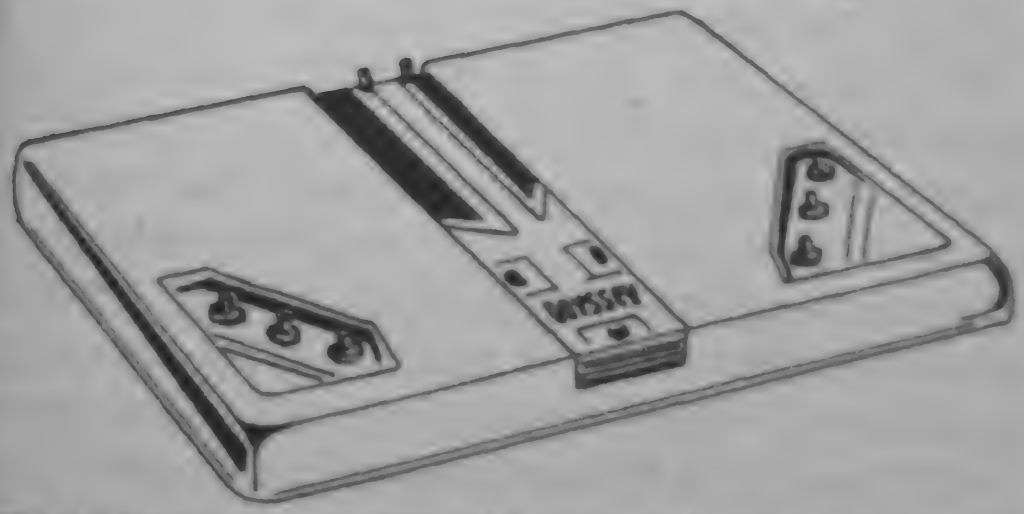


REGULATION TENNIS COURT

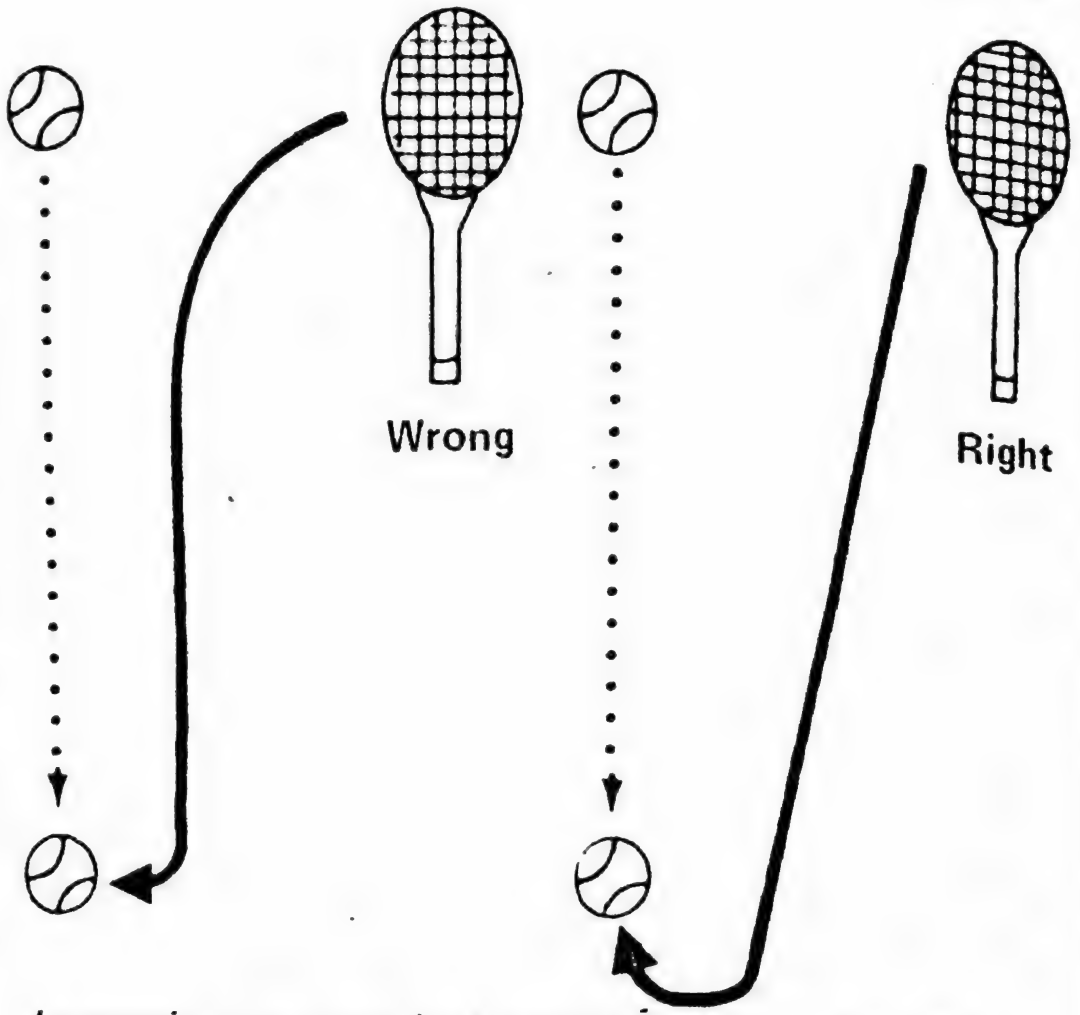
maker). In TV tennis there is no serving sequence or switching of sides or even a small court area in which a serve must land. Since it is impossible to hit a ball into the net in TV tennis, there are no faults that can be called. Conversely, there are no rebound walls in the real game of tennis.

There are, nonetheless, certain psychological tactics that can be used to overwhelming advantage in both a TV game and a genuine tennis match.

Whatever type of video tennis game you have, the object is to defend your court so that your opponent does not drive the ball past you. If your game is like most (but not all), your racquet cannot move horizontally. Once the ball gets past you, you cannot move back quickly to catch up with it; the point is lost. Therefore, you must position the racquet vertically to intercept the ball



The Magnavox Odyssey 400 game allows players to move raquets horizontally as well as vertically.

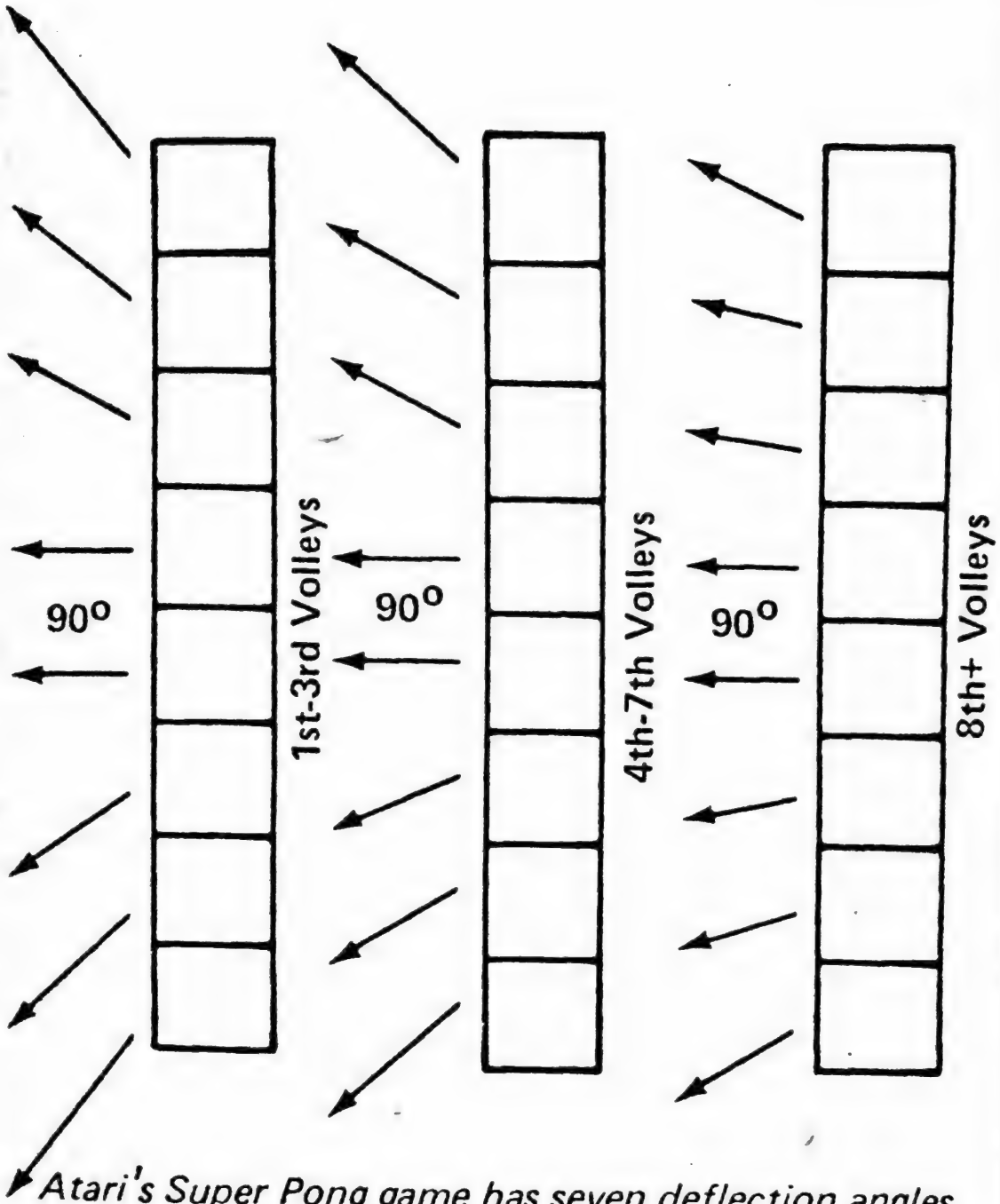


In tennis, you must be in position before the ball reaches your racquet.

before it reaches the horizontal plane in which the racquet moves up and down.

Practice the game on your TV set by yourself; most video games have a practice mode. Familiarize yourself with the serve, speed changes (if any), racquet rebound angles, and wall deflection angles. Learn how to meet the ball with your TV racquet and how to handle ricochets off the walls.

If your game features automatic increass in ball speed, determine how many volleys are required before each increase takes

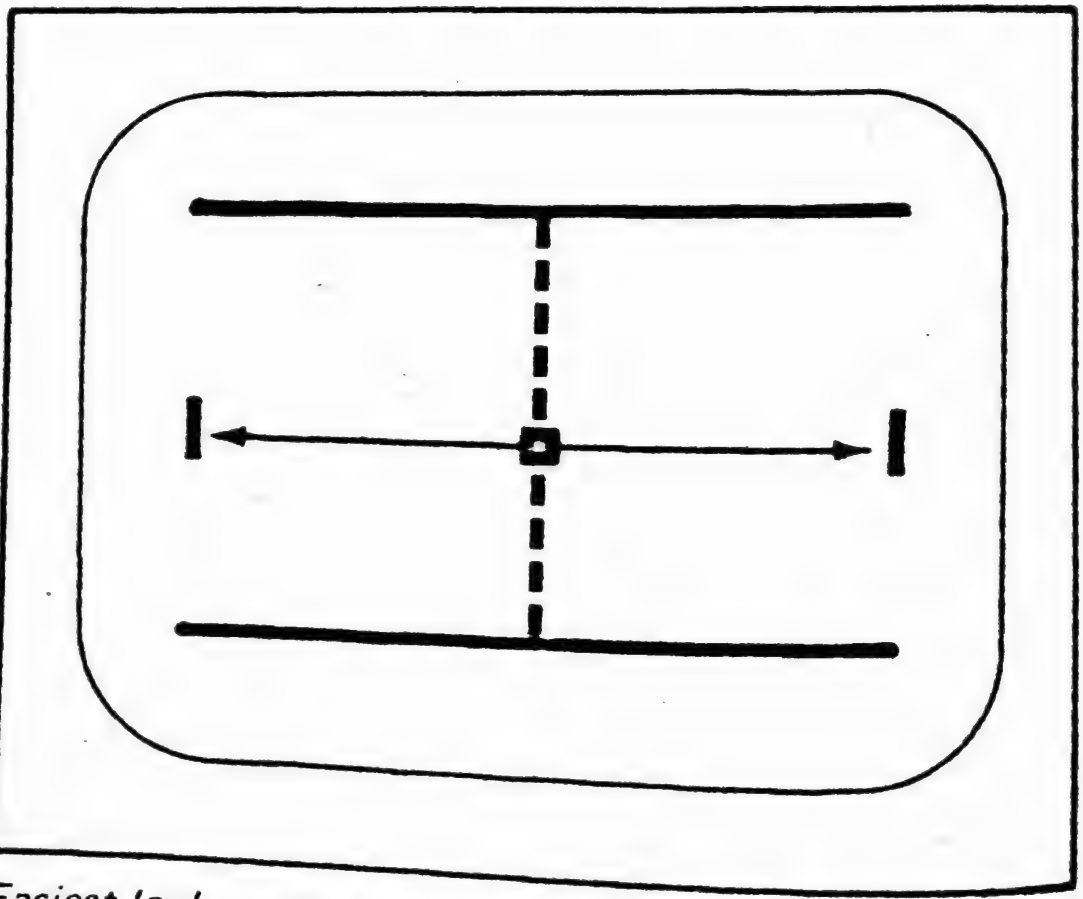


Atari's Super Pong game has seven deflection angles, depending on where the ball hits the raquet. These angles change as the number of volleys increases.

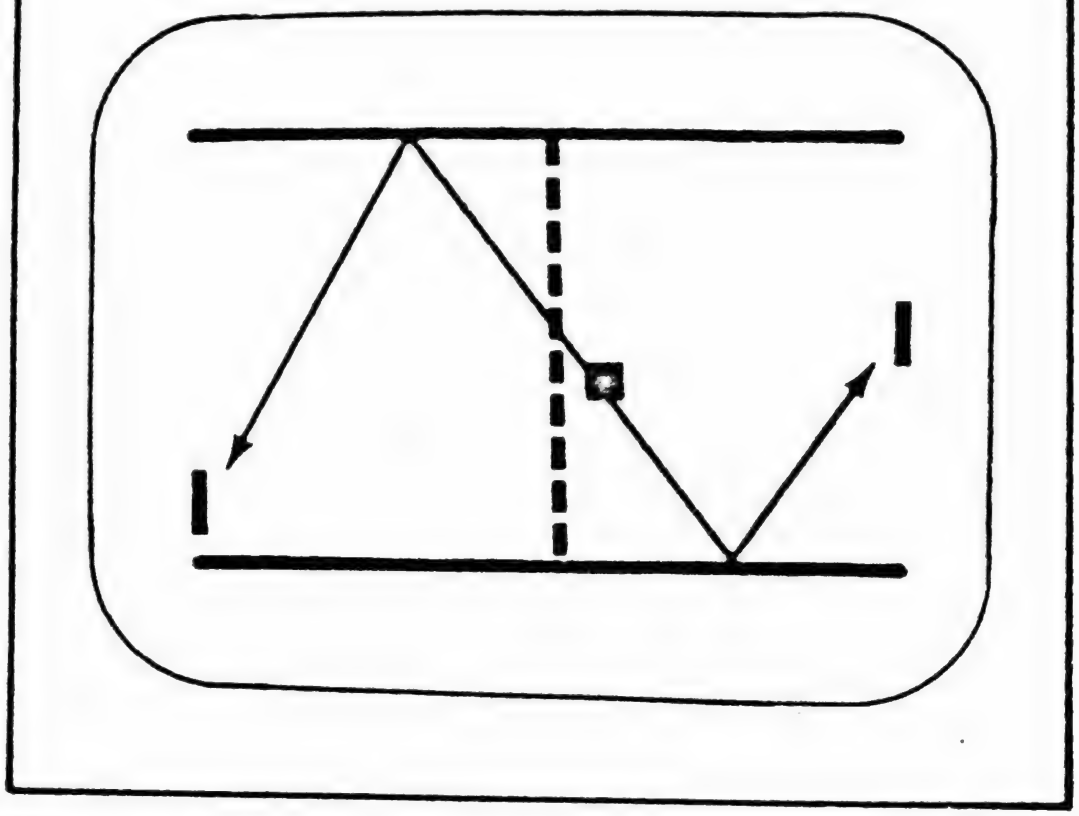
place. The same holds true for learning rebound and deflection angles. With a game like Atari's Super Pong, for example, there are seven different directions that the ball can take when it hits the racquet. Through the first three paddle hits, the angle be-

comes progressively sharper as the ball intercepts the ends of the racquet. From the fourth through to the seventh volleys, the angle becomes shallower. After that, the angle becomes very shallow. Familiarize yourself with how the ball behaves after every change in speed and angle; each alteration requires an adjustment in player reaction.

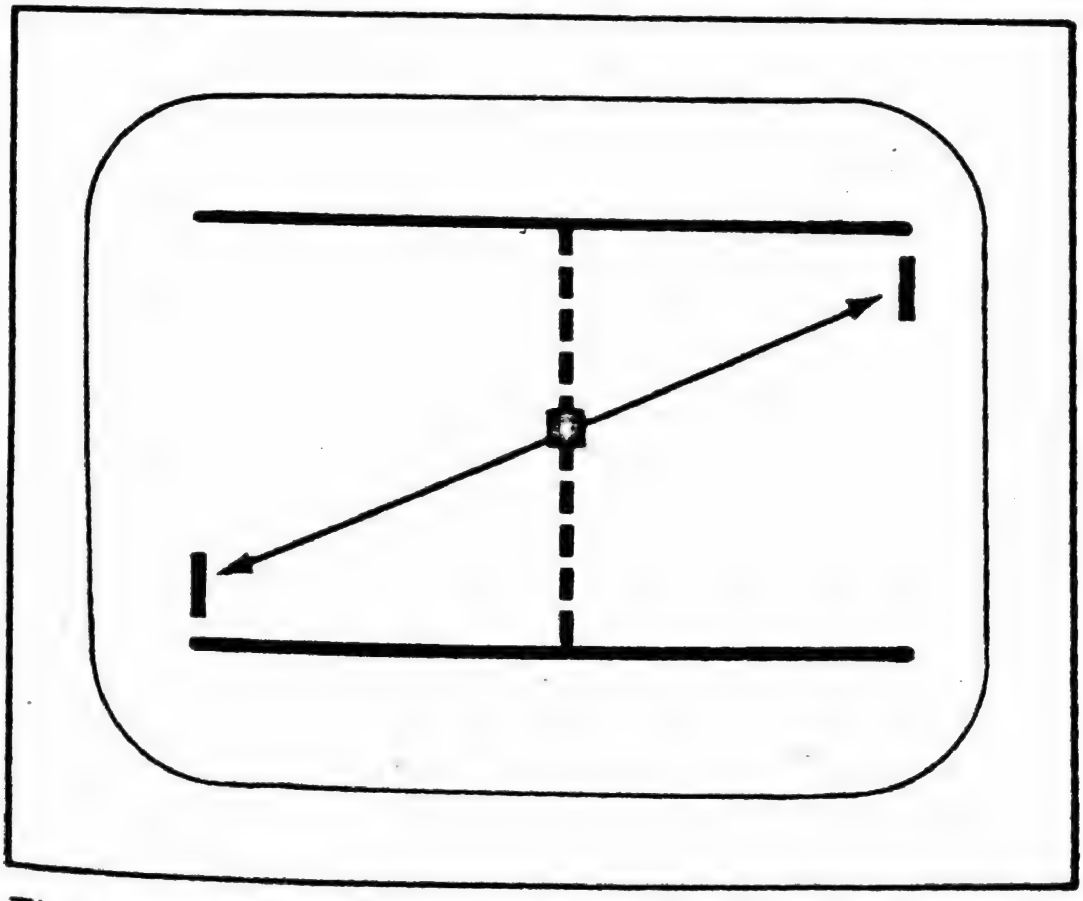
One interesting method of sharpening eye-hand skills is the "lock-up" game suggested by Atari, manufacturer of Pong and Super Pong. This game involves one



Easiest lock-up to achieve is the straight horizontal.



The angle lock-up pattern is of medium difficulty.

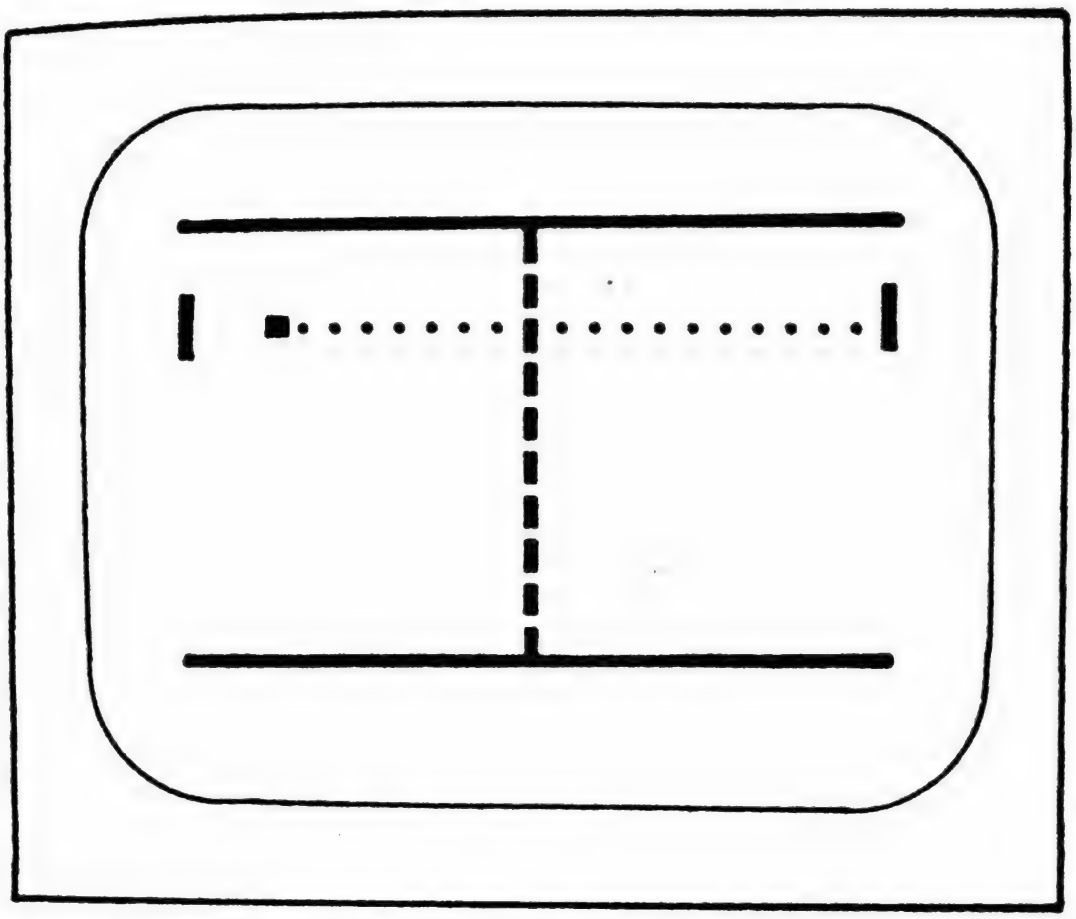


The hardest lock-up pattern is the diagonal.

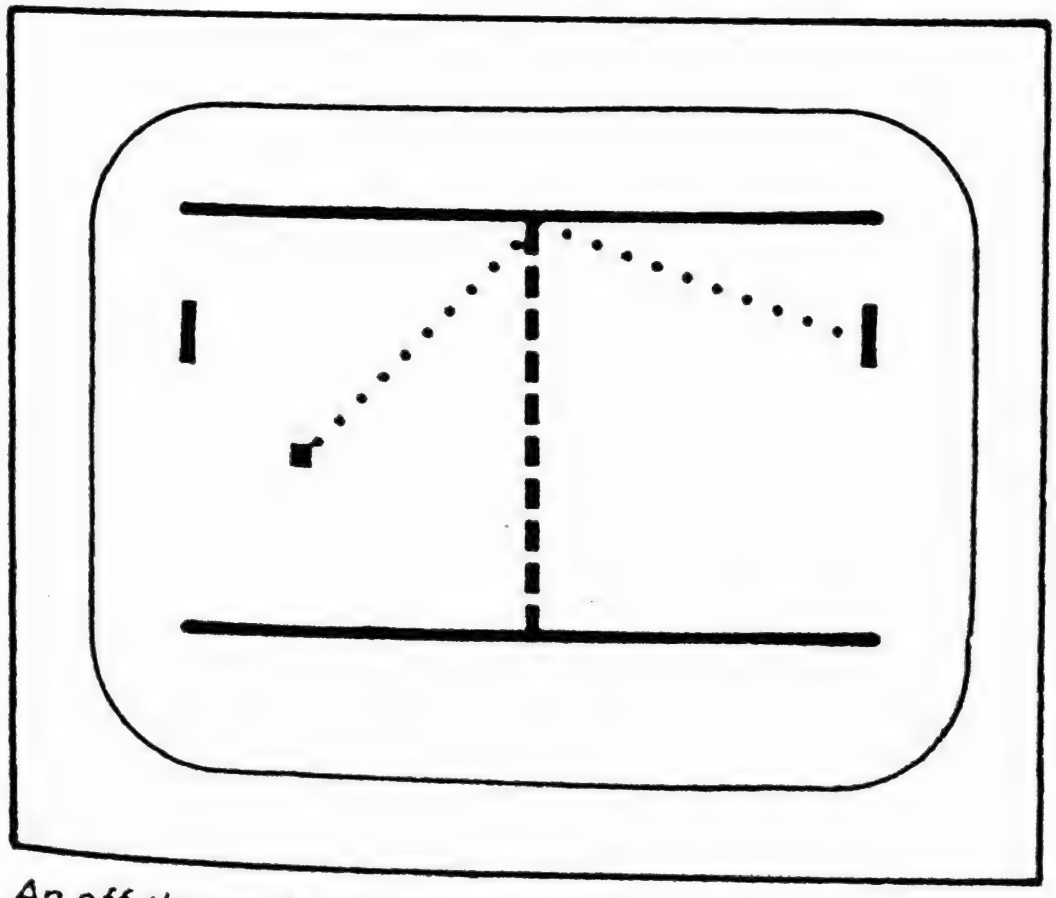
person handling the controls for two racquets to see how quickly both can be maneuvered into a position that results in the ball bouncing back and forth between the two racquets without requiring any further player control movement. The straight horizontal lock-up is the easiest to achieve. Next try the lock-up patterns that have the ball bouncing off the top or bottom walls. By far the hardest lock-up is when the ball-motion pattern is diagonal. Keep one thing in mind, though; if you own a game that changes rebound angle, you cannot start the successful lock-up until after the final angle change has been made.

It is of crucial importance that you know where the serve will originate. Will the ball be served from mid court? From the end court? From a paddle? Once you know about the serve, you can prepare for it and get the edge on your opponent.

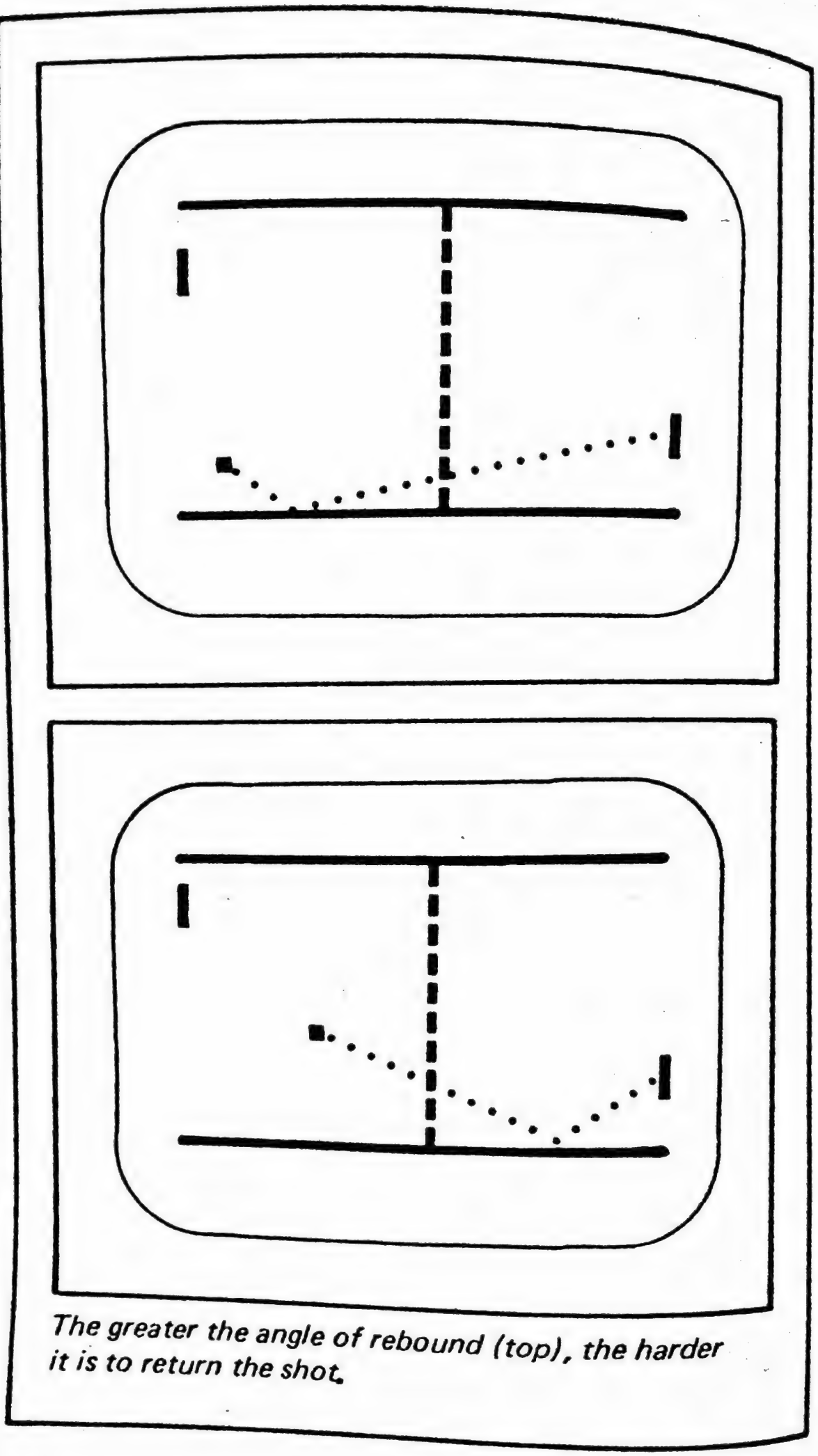
To win at any ball game, especially a fast one where the ball goes back and forth without respite, a player must learn to concentrate. Do not permit yourself to be distracted by anything! But do try to distract your opponent. For instance, after you hit a ball back, move your racquet up and down vigorously. Changes are, you will break your opponent's concentration. If you hit the ball at a sharp angle, throw out a "You'll never get that one!" comment as your opponent moves to intercept it.



A mid-paddle shot will travel in a straight line.



An off-the-wall deflection is harder to handle.



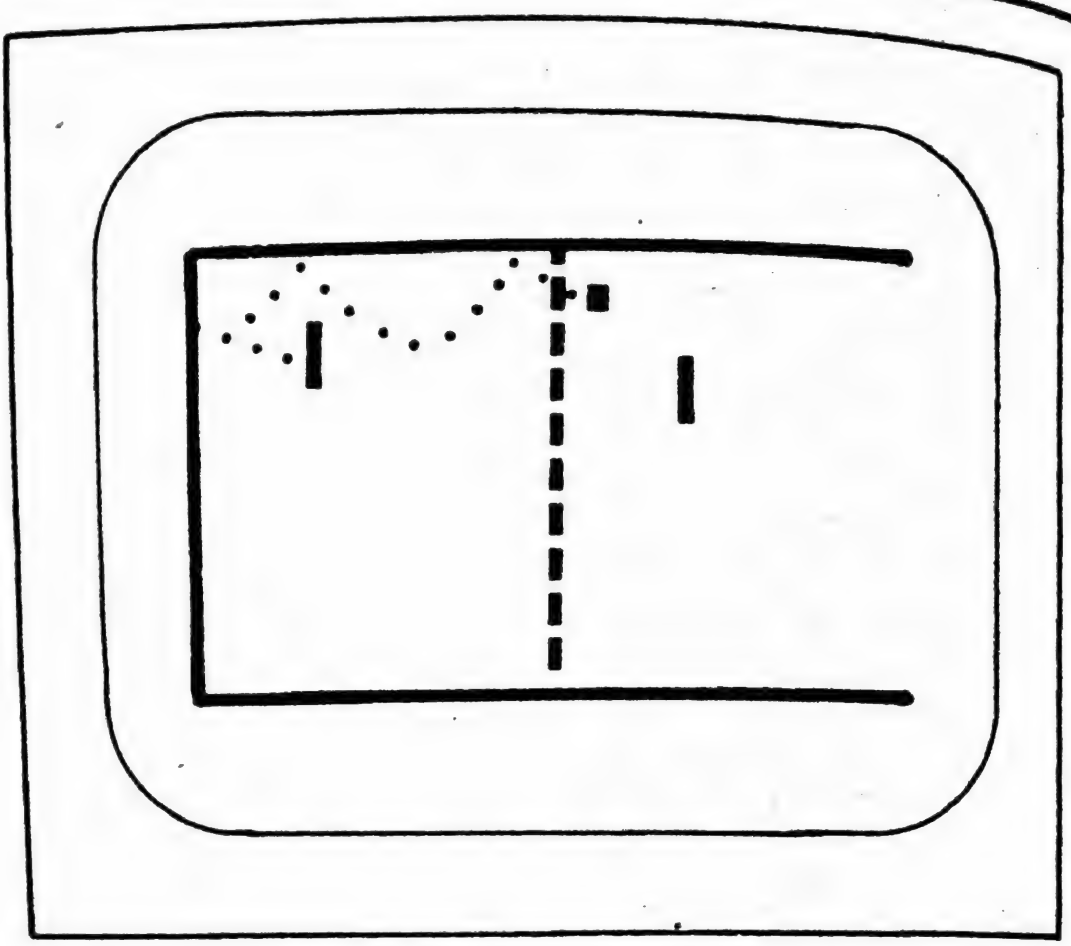
The greater the angle of rebound (top), the harder it is to return the shot.

The greater the angle of rebound or deflection, the harder it is to hit the ball. Consequently, you should always try to hit the ball with a section of the paddle other than the middle. A mid-paddle shot will simply travel in a straight line. Meet the ball as far up or down at the end section of your TV racquet as you can, thereby generating the biggest angle possible and hopefully creating an off-the-wall deflection for your opponent to handle. This really taxes a player's judgment and reflexes.

Always try to return a ball to your opponent's weakness. If he or she displays any difficulty in moving from the bottom to the top of the court to meet your drive, hit it to the top any time the opponent is out of position. Is it a rebound shot off a wall that shakes him or her up? Once your discover an individual's weakness, exploit it and video victories will be yours.

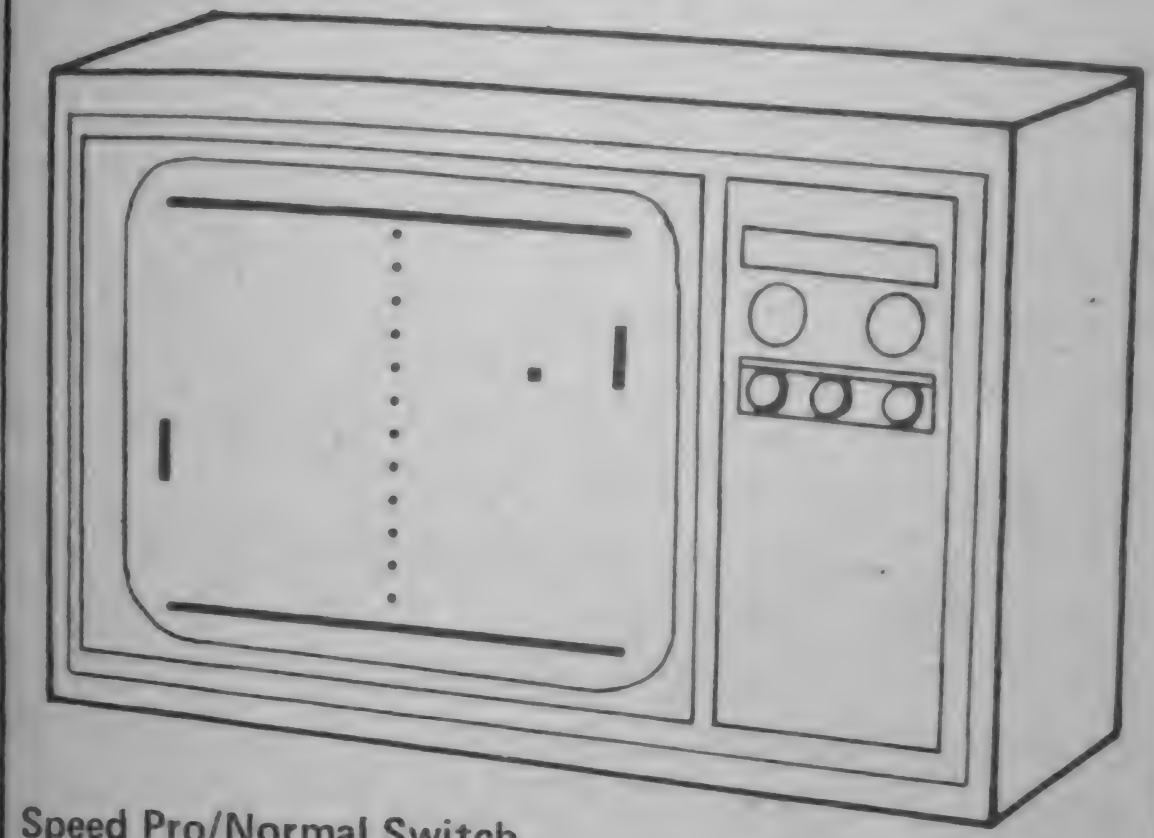
If you own an Odyssey 400 or any other game that permits you to move your racquet horizontally as well as vertically, then you face a different ball game entirely. Now you can rush the net if you wish. Rushing the net deprives your opponent of time to react to the ball hit because of the shorter distance to his racquet.

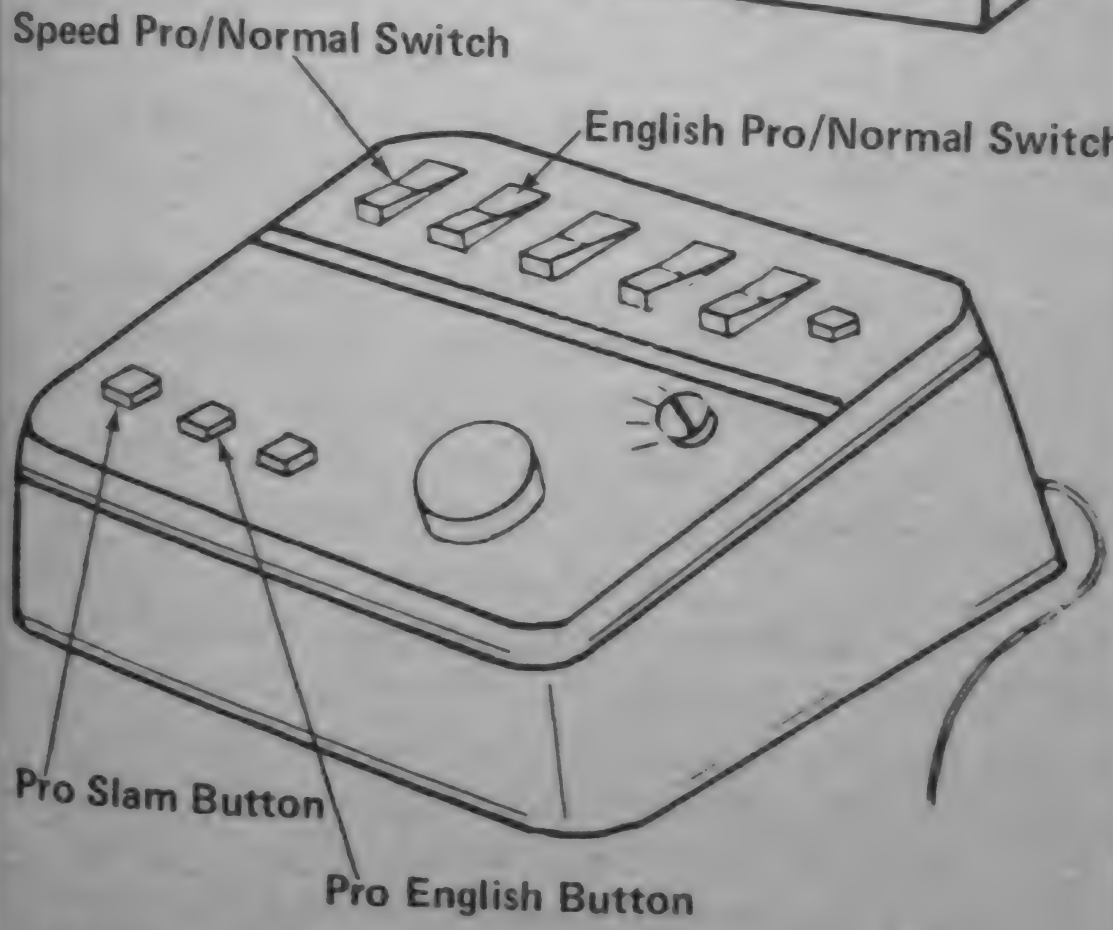
The 400's ball-control feature is another consideration. Whoever hits the ball has ball control until the other player hits it. Therefore, after you hit it, try to maneuver



The Odyssey 400's ball-control knob can actually make the ball jump over the opponent's raquet. An especially tricky move is to activate the control swiftly as the ball rebounds off a boundary.

the ball just before your opponent's racquet reaches it. This calls for a very quick twist of the ball-control knob, making the ball jump over the racquet, followed by a sharp twist in the opposite direction to ruin any attempt your opponent could make to save the point. An especially tricky move, one that will dazzle your opponent, is to activate the control swiftly as the ball rebounds off a boundary. The unanticipated angle deflection will surely throw the opponent off balance.





If you have a game like Ricochet, by all means utilize the slam button and English control. But use them selectively. The idea is to surprise your opponent.

If you have a slam button or an "English" control on your game, by all means use it to surprise your opponent. Just be sure to use it selectively. The same is true for the manual-serve function. Serve quickly at times — before your opponent is prepared — while at other times just stall as you talk to your opponent. At the moment he starts to reply, drive the serve at him.

At least one video game features what is sometimes called "gravity" tennis. This refers to the ball moving across the screen in an arc rather than in a straight line. Clearly, gravity tennis is closer to the real game. It certainly is more difficult to track down a ball that arcs than a ball that follows a straight line. Unfortunately, most games do not offer gravity tennis.

If you are winning, do not change your game plan. Stick with any approach that proves successful. If you go ahead and can see victory at hand, don't let up! Many players simply boot the game when they have just a couple of points to go. In TV tennis, it doesn't take much of a run for an opponent to get back in the ball game.

People who play TV tennis more closely identify the game with table tennis than with lawn tennis, also called "Ping Pong." Played on a small table that measures 9 feet long by 5 feet wide and that is 2-1/2 feet off the floor, table tennis is a game in which tactics play nearly as important a role as do the basic skills. Control the ral-

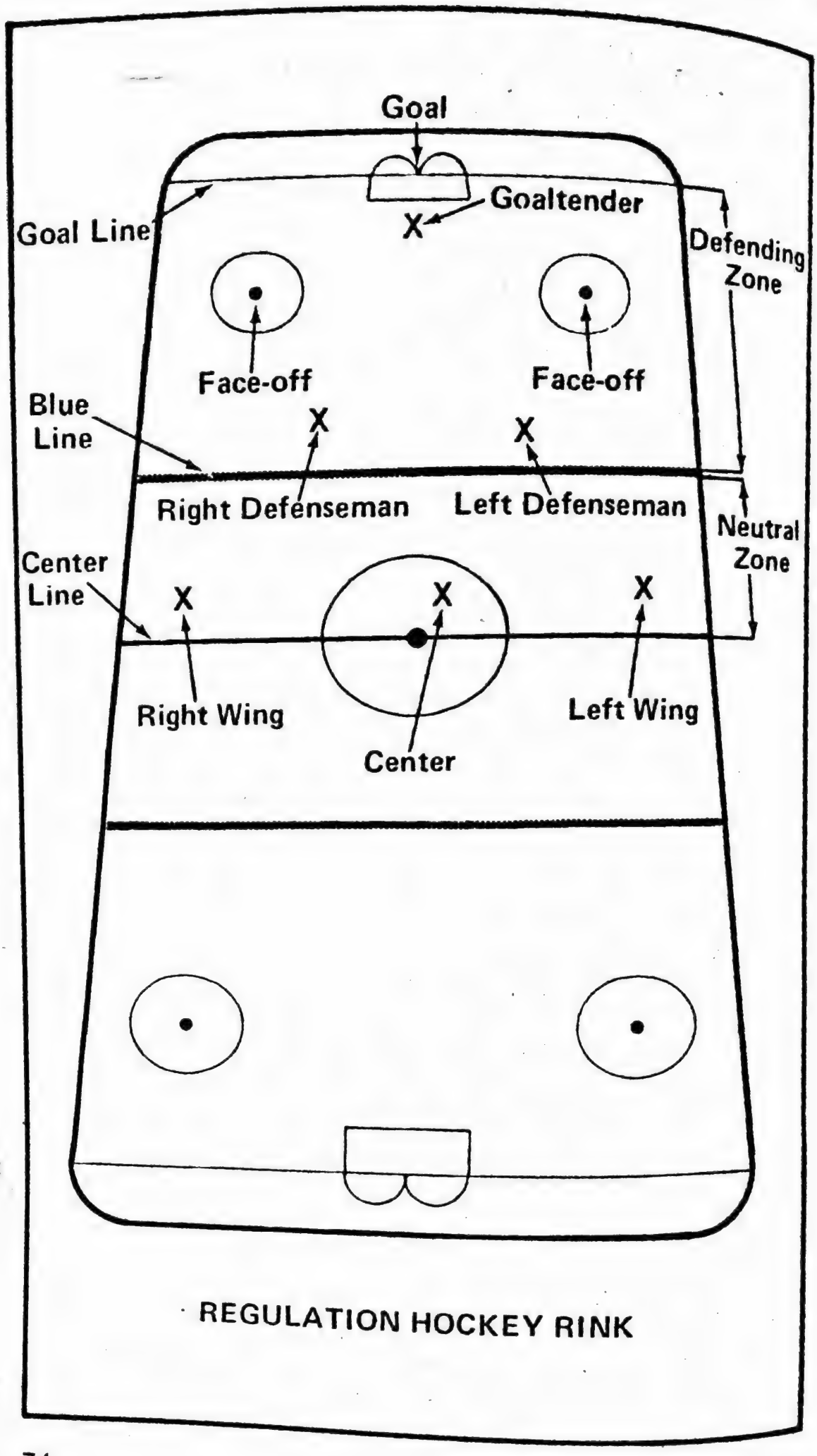
lies, concentrate, and keep your eye on the ball are the keys to winning — be the game lawn tennis, table tennis, or TV tennis. Breaking up the pattern of play with a sudden change of pace usually takes the opponent by surprise and often wins the point.

In any ball game of quick hit and return, you should feel out your opponent as soon as possible to learn about weaknesses that you can exploit. In real tennis — lawn and table — you can use "top spin," "slices" etc., which are obviously out of the question in the video versions. But the basic principles involved in reacting to a ball coming toward you at different angles and at different speeds are much the same.

Video Hockey Resembles Real Rink Action

TV HOCKEY IS more akin to the real sport than is video tennis. After all, in ice hockey the puck actually does bounce off rebound walls, three- to four-foot high barriers — called boards — surrounding the ice rink. Screens or sections of tempered glass frequently surmount the boards to protect spectators from high-flying pucks.

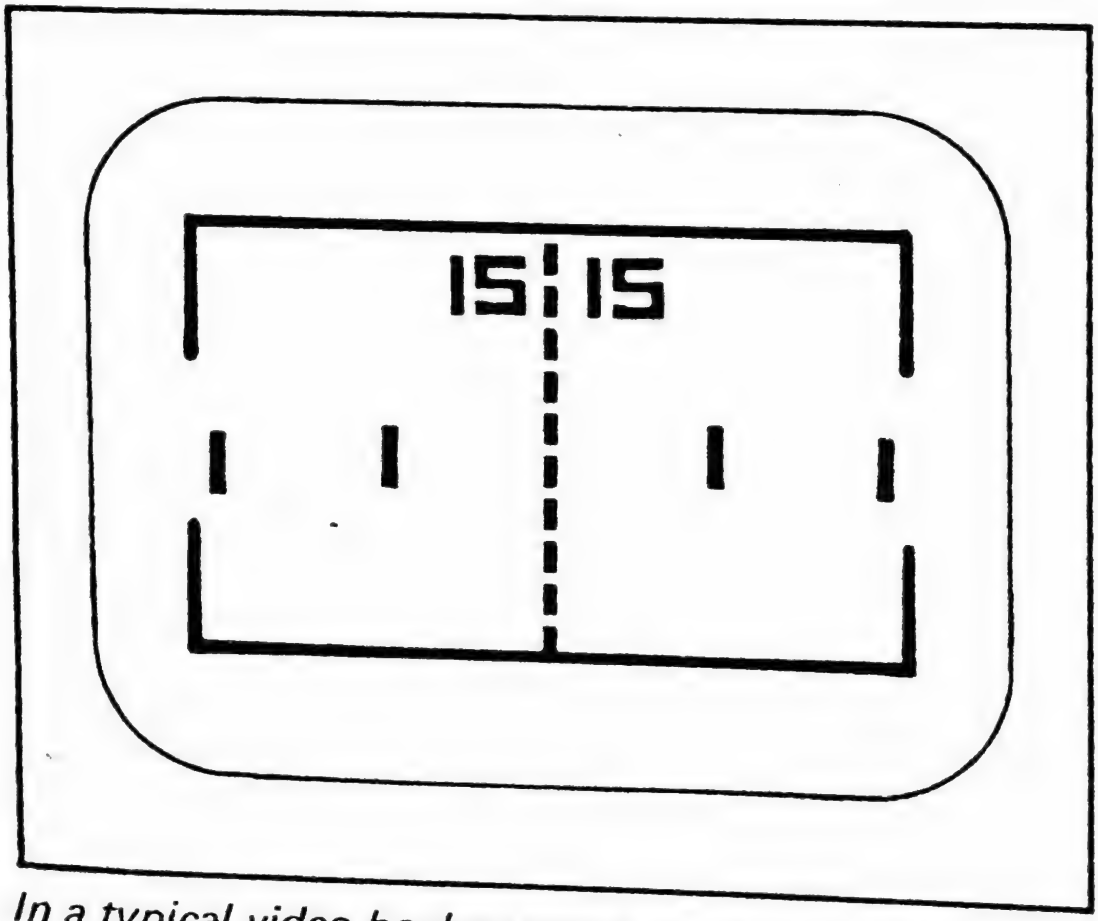
The goal cage or net is a six-foot by four-foot area guarded by a goalie. The puck is a piece of vulcanized rubber measuring three inches in diameter by one



REGULATION HOCKEY RINK

inch thick. In the real game of hockey, a puck can travel beyond the goal and bounce off the wall behind the net. Players — including the goalie — can go behind the goal to retrieve a puck. In TV hockey there is no behind-the-goal area, and the goalie is generally restricted to vertical movement only, although there are a few games in which the goalie can move horizontally as well.

A real hockey team has six players on the ice: goalkeeper, three forwards (a left-wing, right-wing, and center) and two



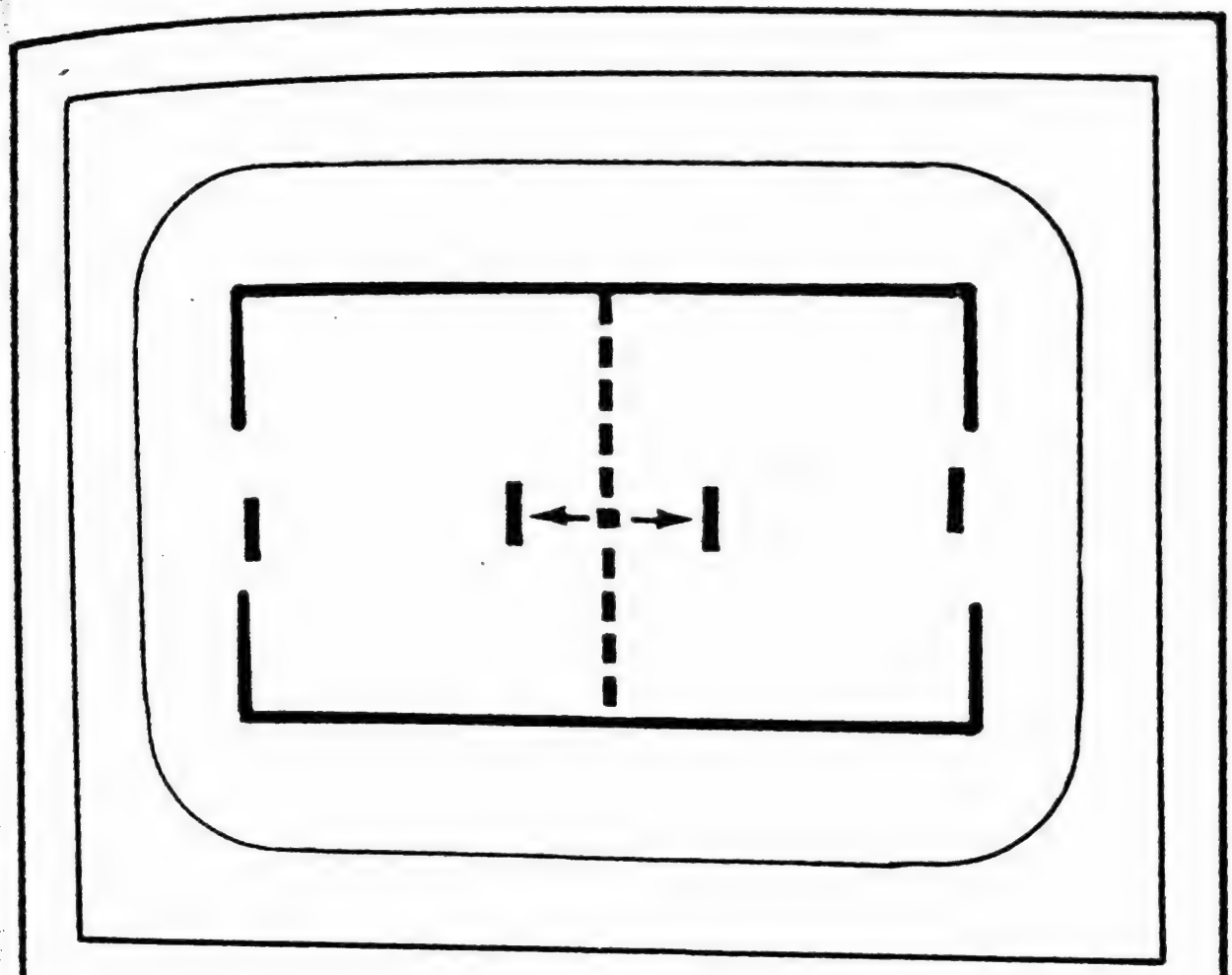
In a typical video hockey game, goaltenders are in front of the goal and forwards are near center line.

defensemen (left defense and right defense). In most TV hockey games, there is only a goalkeeper and a defenseman. Some video game models do have a "player" that can act as a forward, while a few others have as many as three sticks in addition to the goalkeeper.

There are three 20-minute periods in actual ice-hockey contests. A team scores a point by shooting the puck into the opponent's net, and the team that scores the most points within the specified game time span is the winner. In contrast, a TV hockey game consists of a fixed number of points, the contest lasting as long as it takes one participant to score the requisite number of goals.

In both the real ice-hockey rink and the video hockey display is a center line, bisecting the playing area. In the middle of the real rink's center line is the "face-off" spot, a 30-foot circle around the actual spot in the middle. A hockey game starts at the center face-off spot. Here two opposing players, the centers of each team, face each other with the bottoms of their hockey sticks flat on the ice. A referee drops the puck and the two centers vie with each other to play it off. During this one-on-one contest, other players cannot enter the restraining circle.

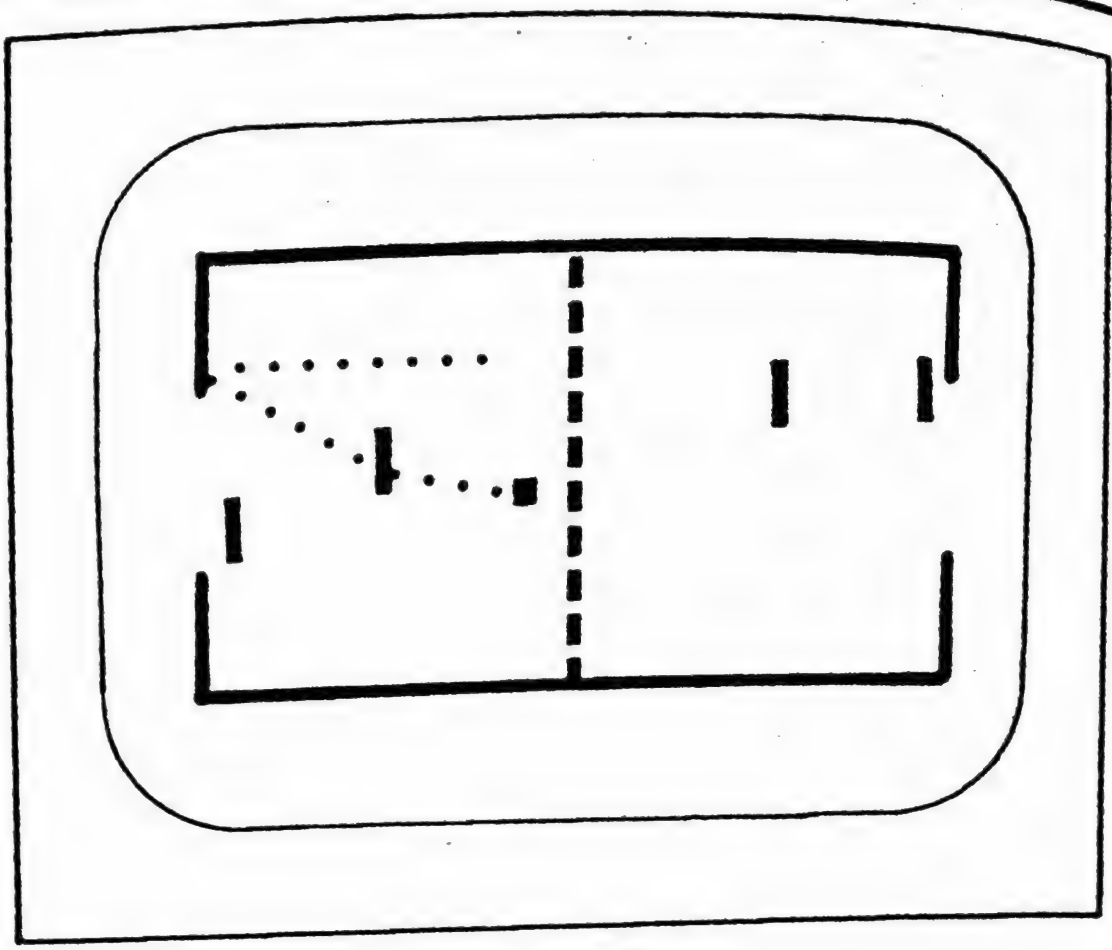
The forwards are generally the fastest skaters and the best shots. The defense-



Executive Games' Face-Off is so named because it allows for authentic face-offs.

men, on the other hand, try to prevent the opposition from getting in close to their team's goal. Thus, they guard the opposing team's forwards. On offense, they generally pass the puck to their forwards. Passing in today's ice hockey game is, in fact, the key element to successful play. Another thrilling aspect of the actual sport is stickhandling, in which the puck is nursed along against a player's stick — sometimes at breathtaking speed — down the rink.

Passing and stickhandling are inconse-



In most TV hockey games, a puck hit by the goaltender can pass through the back of the team's forward.

quential aspects of most video hockey games. In most TV games there is one forward on each team permanently located on one side of the center line or the other. The back side of a "stick" is largely transparent to the "puck," which passes right through a forward's back when hit by the goalie on the same team. In some TV games, however, there is a deflection angle caused when the puck passes through a stick. On the other hand, there is one game — "Face-Off" — which permits a player to

catch the puck. Although there are no forwards in Face-Off, the principle remains the same. The puck will stick to a player's hockey stock following a rebound off a wall or a shot off an opposing player's stick. A firing button even enables a player to shoot the puck toward the opposing team's goal. Video games other than Face-Off require that players try to score by hitting the puck much as they would the ball in video tennis.

In real ice hockey, a team does not earn a point if the puck is kicked in or thrown in the opposing goal or if another attacking player is in the goal-crease area, which is a small area in front of each goal. Face-offs can occur during the game if the puck goes out of bounds — i.e., bounces over a retaining wall, gets caught in the goal net, becomes frozen between players' sticks, or is shot past the goal line from a position behind the center line and touched first by an opponent. The last instance is called "icing," but play is not stopped for a face-off if the puck could have been handled by an opponent before it crossed the goal line, if the puck touched the goal-crease line, or if the attacking team was short a player (in hockey, a player can be penalized by removal for a specified period of time without being replaced). Obviously, these considerations are not a part of a video hockey game.

The real hockey game has a host of

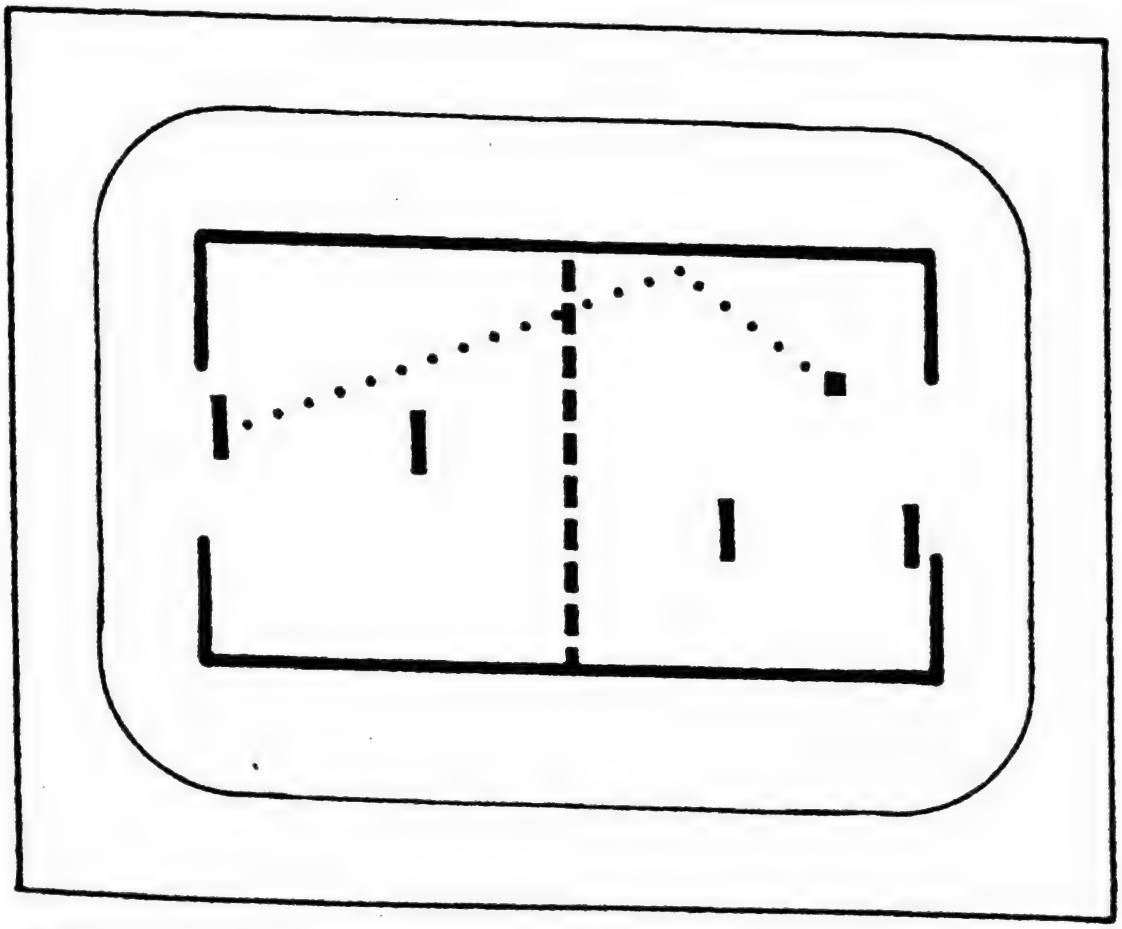
penalties that can be called by the referee. Assisting the referee are two linesmen, two goal judges, an official scorer, game timekeeper, and penalty timekeeper. In video hockey games, the score is maintained automatically by the machine. With at least one TV game — Fairchild's Video Entertainment System — time is maintained automatically as well.

Checking is another move, a defensive one, used in the real game of ice hockey. Checking is when a player tries to block another player or steal the puck from him. It is a move that TV hockey games cannot duplicate, with the single notable exception of Face-Off which offers a limited degree of checking. In Face-Off checking, the puck being carried on a stick can be dislodged by another player colliding with the stick. When this happens, the puck either bounces off or is taken over immediately on the other player's stick.

In TV hockey games, the goaltender is positioned near the goal opening and moves up and down either to hit the puck or to prevent the puck from entering the goal opening. The real hockey goaltender guards the goal carefully when play is in his area, the defensive zone, or even when the action is at center ice. He can prevent a puck from entering his goal by blocking it with any part of his body, as well as his stick, which has a wider blade and lower

end shaft than the other players. He is also heavily protected by a mask, body pads, and well-padded gloves. The goalie does not always position himself in front of the goal, however. He may retrieve a puck to the side of the goal area if the way is clear and safe.

Tactics and strategy in TV hockey largely depend on the specific game you have. For example, suppose your game has a goalie and one forward per side, the latter located in the opponent's half of the TV rink. The puck is served from the player's goalie stick



Always try to hit the puck so the opponent's forward cannot reach it.

(the player who won the last point serves), but the serve is performed automatically by the machine.

If your opponent is serving, try to keep your forward's stick roughly parallel to the opponent's goalie stick so that when the puck is shot into the playing area your forward can hit it. It may take a few serves before your opponent realizes that the position of his goalie stick is very important on a serve.

When the puck comes at your forward, try to meet it with the upper or lower part of the stick (depending on whether you want to hit the puck diagonally up or down) in an effort to score a fast point. Avoid hitting it squarely in the center if you are approximately parallel to your opponent's stick because it will bounce off quickly and come back at you. If you cannot manage to set yourself up for what is the equivalent of real hockey's "slap shot" or "wrist shot," then try to hit the puck against the boundary on the goal side so that it will bounce off and hit the side court wall. After doing this, you should be prepared to move your stick quickly toward the area where you expect the reflected shot to land, meeting the puck with the lower end section of the stick if you must hit it diagonally downward to score a point or vice versa if you are aiming at the opposite wall.

You may experience a lock-up on a

serve when you meet the puck with the center of your stick and hit it into the center of your opponent's stick which is parallel to yours. If the lock-up occurs in front of your opponent's goal, try to break the lock-up rapidly by moving your stick slightly so that the ball rebounds at an angle. If the lock-up takes place away from the opposite goal area, let your opponent break it, but be prepared to move your stick in either direction to get a piece of the puck as it comes at you on an angled deflection. Unless you are reasonably close to the goal opening or the goal opening is especially wide, you will only bounce the puck off a wall into your defending area.

When the puck does enter your defense zone, you must use your goalie to prevent the puck from entering the goal opening. This is easy enough to do. But be careful when your opponent's forward meets the puck following a hit from the opposition goalie. The puck will go right through the forward and emerge at a shallow angle. Be prepared for this change of ball path, which will be either a little upward or downward. Many goals result from such instances.

Also be aware that when you hit the puck back, the opponent's forward can shoot it right back to your goal area. Therefore, try to hit the puck so that the opponent's forward cannot reach it; the idea is to send it into your opponent's defensive area. This

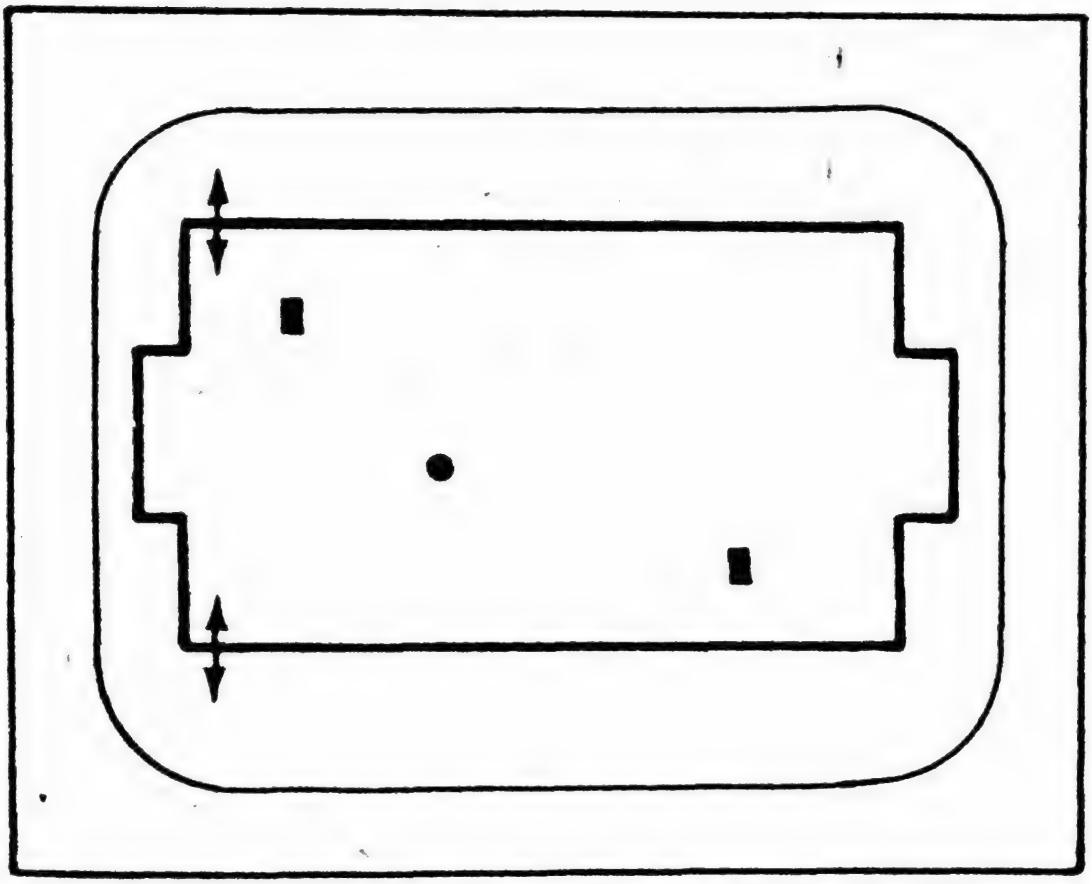
might mean banging it off a side wall, but you should do anything you can to get the puck away from your defense zone.

In shooting a puck toward your opponent's goal from your goal area, you have a few choices to make. You can bounce it off a wall to escape your opponent's forward or you can hit it straight toward the other goal. Hitting it straight when you can avoid your opponent's forward stick is the best tactic. The reasoning here is that you can set up your forward to take the offensive when the opposing goalie hits the puck back. Moreover, this strategy gives your forward an opportunity to let the puck go through the back side of the stick so that it will deflect at an angle, making it more difficult for the opposing goalie to hit. Ideally, you should catch the puck going through your forward's stick when your stick is near the goal, hopefully sneaking one through the opponent's goal opening.

Many TV games do not have a forward positioned in the opponent's half of the court. Instead, the forward is frequently positioned near the center line in the defense zone. This kind of player positioning calls for a different set of tactics.

In this situation, the rebounding puck from the forward's stick can be hit back directly by a forward. If you are on defense, be especially cognizant of the position of your goalie. Since most games have the

forward and goalie locked together, parallel to each other, a forward located at the top end or bottom end of the screen means that your goalie is way out of position to defend against a "slap shot" toward your goal. Therefore, you should be ready to turn your stick control or move your lever instantly to bring your goalie into a defensive position to prevent the puck from entering your goal area. Remember, too, that a puck that goes through a forward will follow a deflected path. Another thing to bear in mind is that



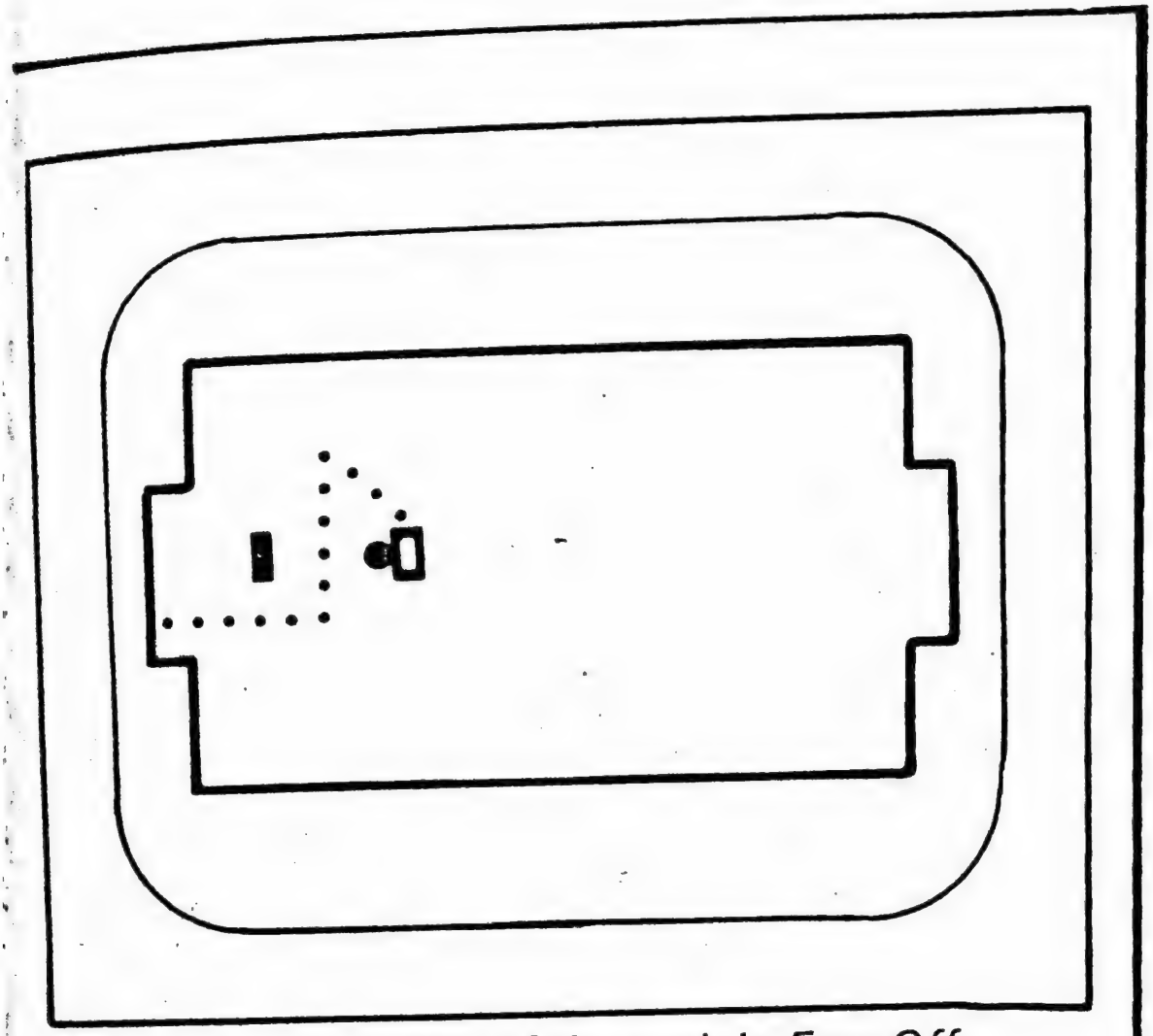
In Face-Off, when a goal is made, the goal are itself disappears and for a few moments a plain rectangle appears on the screen.

the speed of the puck changes on many games after a prescribed number of volleys. Deflection angles may change as well.

The Face-Off game requires a different tactical approach altogether. Its joysticks can maneuver the puck all over the rink and its stick can hold onto the puck. Therefore, as soon as the puck comes into play at center ice, rush in to touch it. When you do, it will stick to your hockey stick. Now that you have control of the puck, move in swiftly toward your opponent's goal in an effort to score. The direction that the puck travels on a shot is totally dependent on the direction that the stick is moving when the "shoot" button is pressed.

Do not press the "shoot" button just because your opponent is not in your path. The shoot button should be used for only two purposes: (1) a shot toward the goal when you feel confident that you are lined up to make one; and, (2) bouncing the puck off a wall when it appears that your opponent may well dislodge it from your stick. In the latter instance, of course, you try to retrieve the puck. You should be able to do this easily because you know where the puck is headed and, therefore, where it will be on the rebound. Move quickly to that vicinity as soon as you press the shoot button.

As you move at top speed toward your



When you gain control of the puck in Face-Off, dodging around your opponent, move in swiftly to his goal in effort to score.

opponent's goal, remember that your opponent can check you with his stick. If his stick touches yours, the ball will be knocked loose and you will have to scramble for it. To avoid this, be prepared to move your joystick very quickly in one direction and then another in an attempt to jump around your opponent.

In any video game, especially one with control of horizontal movement, learning how to fake a move is of the utmost importance. A slight shift in one direction to get your opponent off balance, followed by a

quick shift and forward rush is the kind of movement for which you should strive. Practice by yourself so that you can make fakes and forward rushes in any direction.

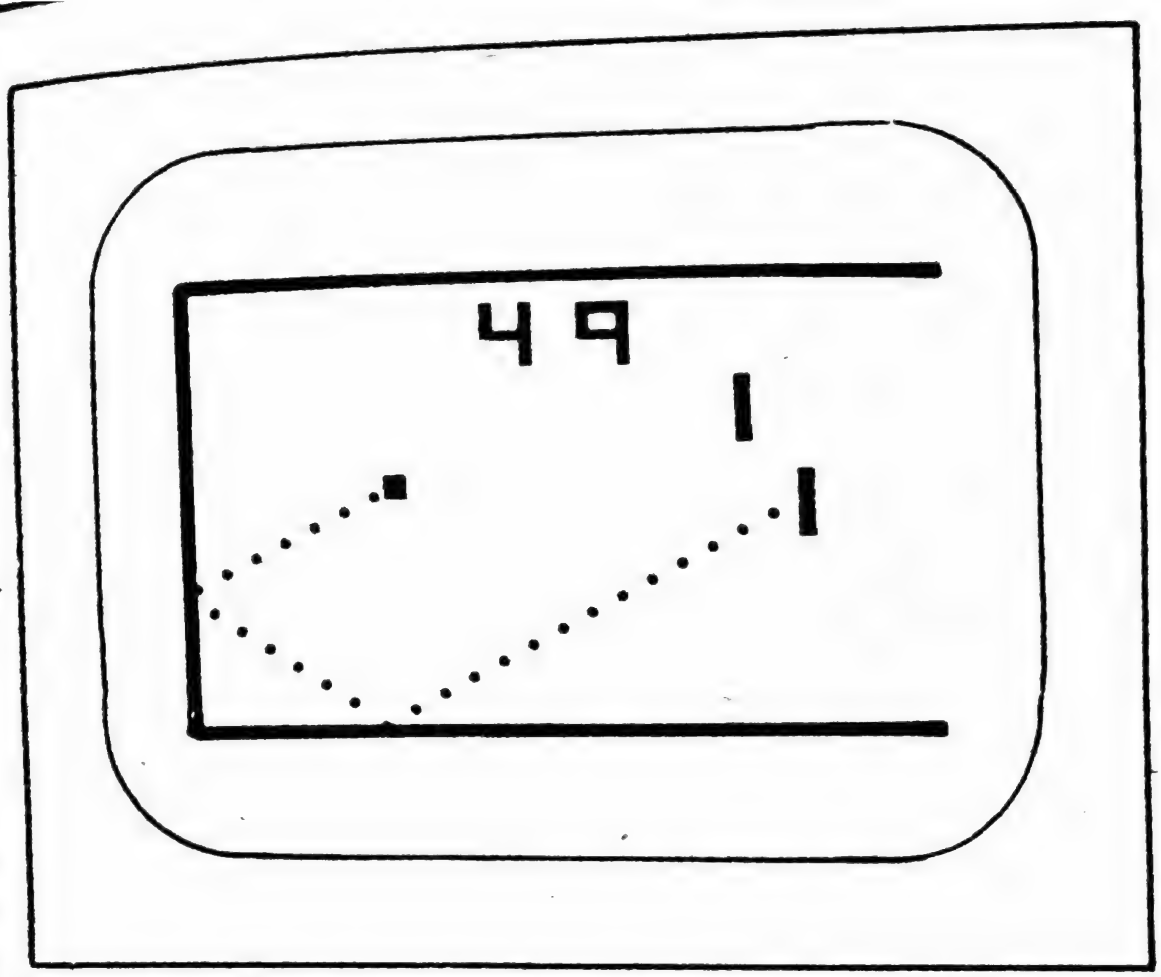
Practice with whatever game you have to build up your skills and to reduce your reaction time. You will probably progress slowly from a novice to intermediate to expert. When you become proficient in handling high speeds with a small stick, however, you should be able to beat anyone at any skill level.

A Game With Many Names

ANOTHER POPULAR TV video game goes under various names — squash, smash, paddleball, handball, and racquetball. Most video squash games are two-player types.

The paddles depicted on a TV screen are often a little out of line, with one paddle being more forward than the other. Should a player's racquet intercept a ball when it is not his turn, the ball simply passes through as if the racquet never existed. Some TV games have racquets of different colors to avoid confusion. There are also video games in which a player disappears from the face of the screen after hitting the ball, leaving only the player whose turn it is to hit the ball next.

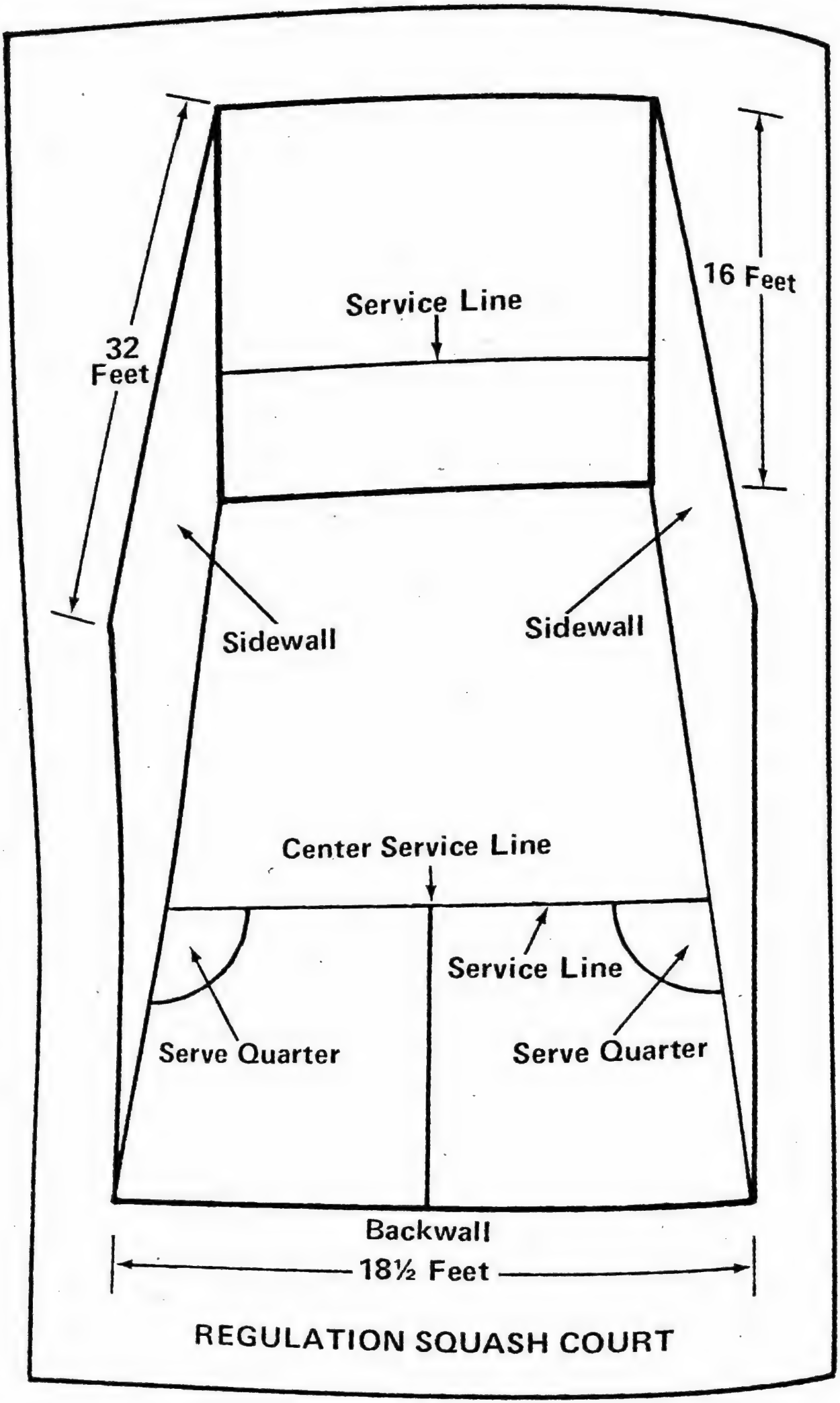
The actual game of squash was intro-



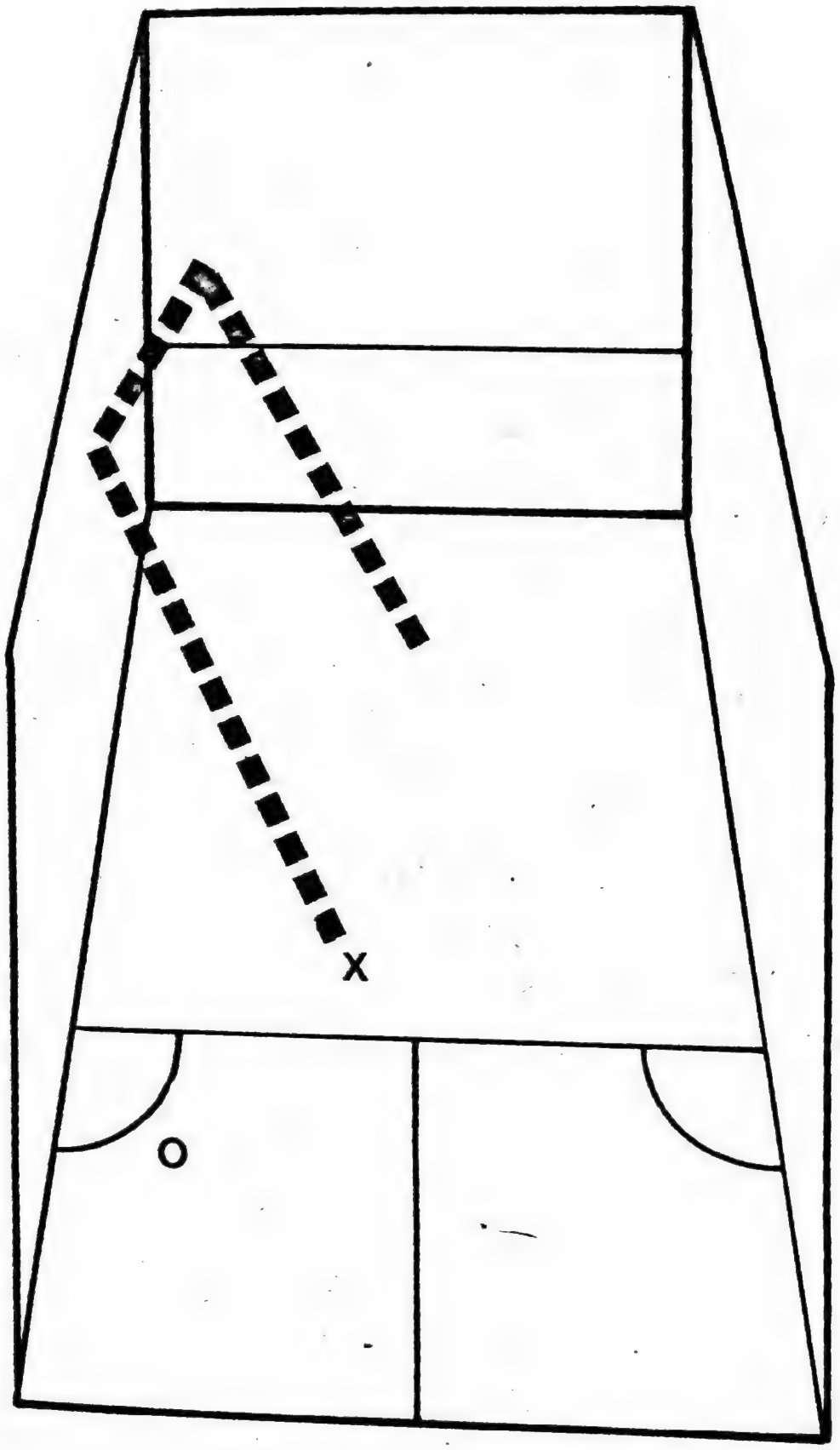
Squash paddles are often depicted on the TV screen as a little out of line, with one more forward than the other.

duced to the United States in 1890. It originated in London, England in the 1800's, where it was a favorite of people locked up in debtor's prison. At the time of its origin, a soft ball was used that made a "squashy" sound. Winning tactics for the game of squash on the real court include controlling the "T" — the center of the court. Forcing an opponent to vacate the center portion of the court is what every player strives to do.

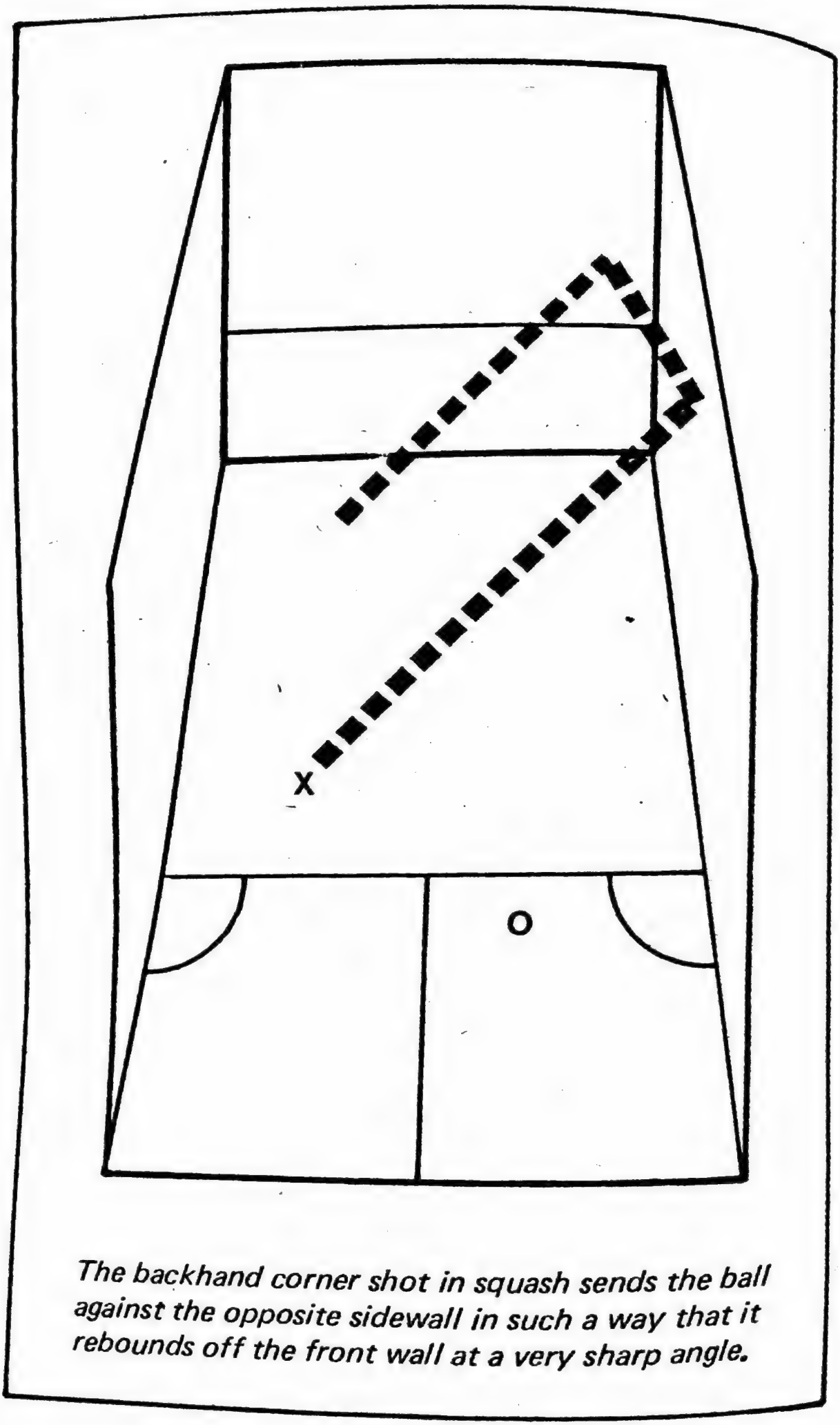
In the real game, the first player to score 15 points generally wins the game; that is



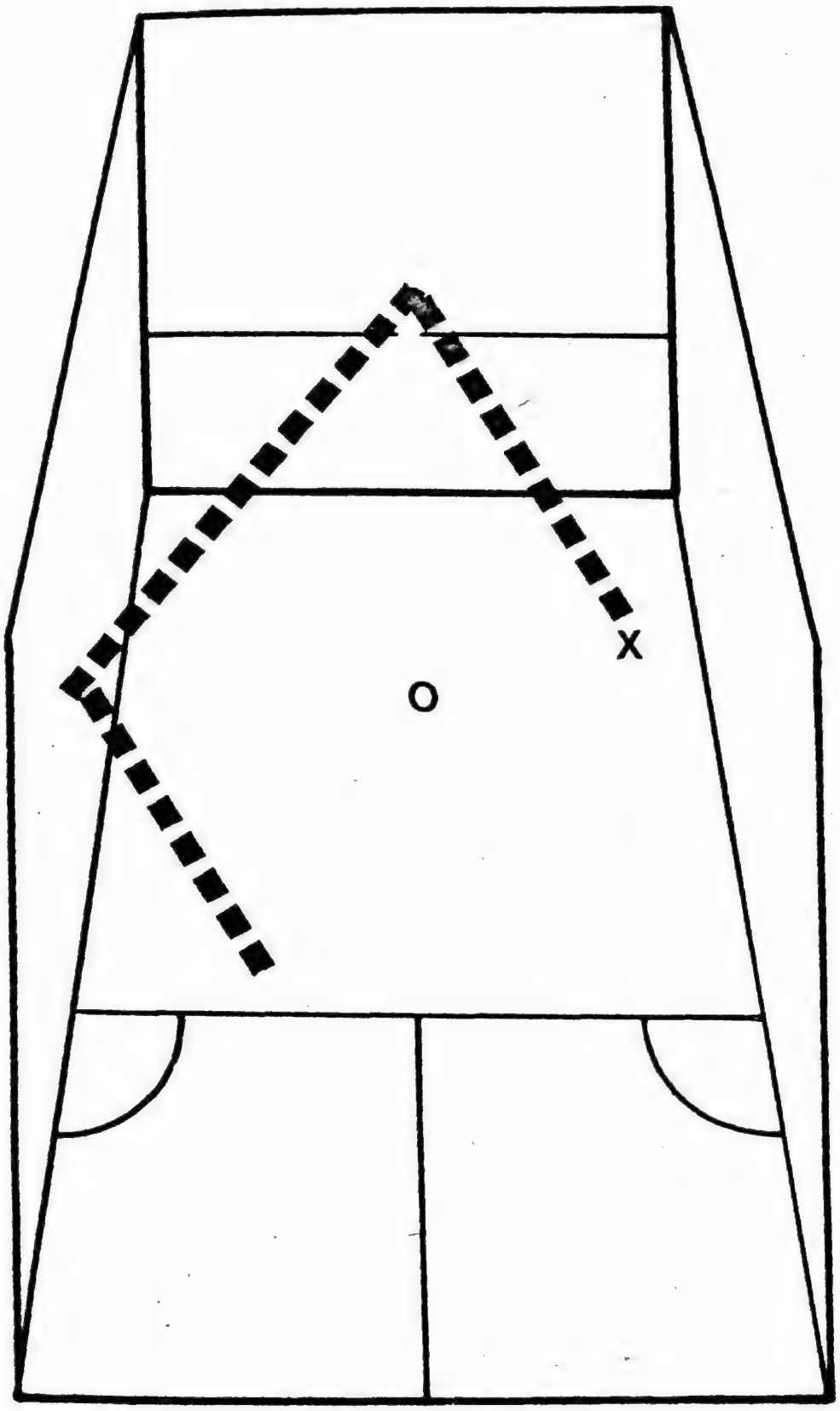
REGULATION SQUASH COURT



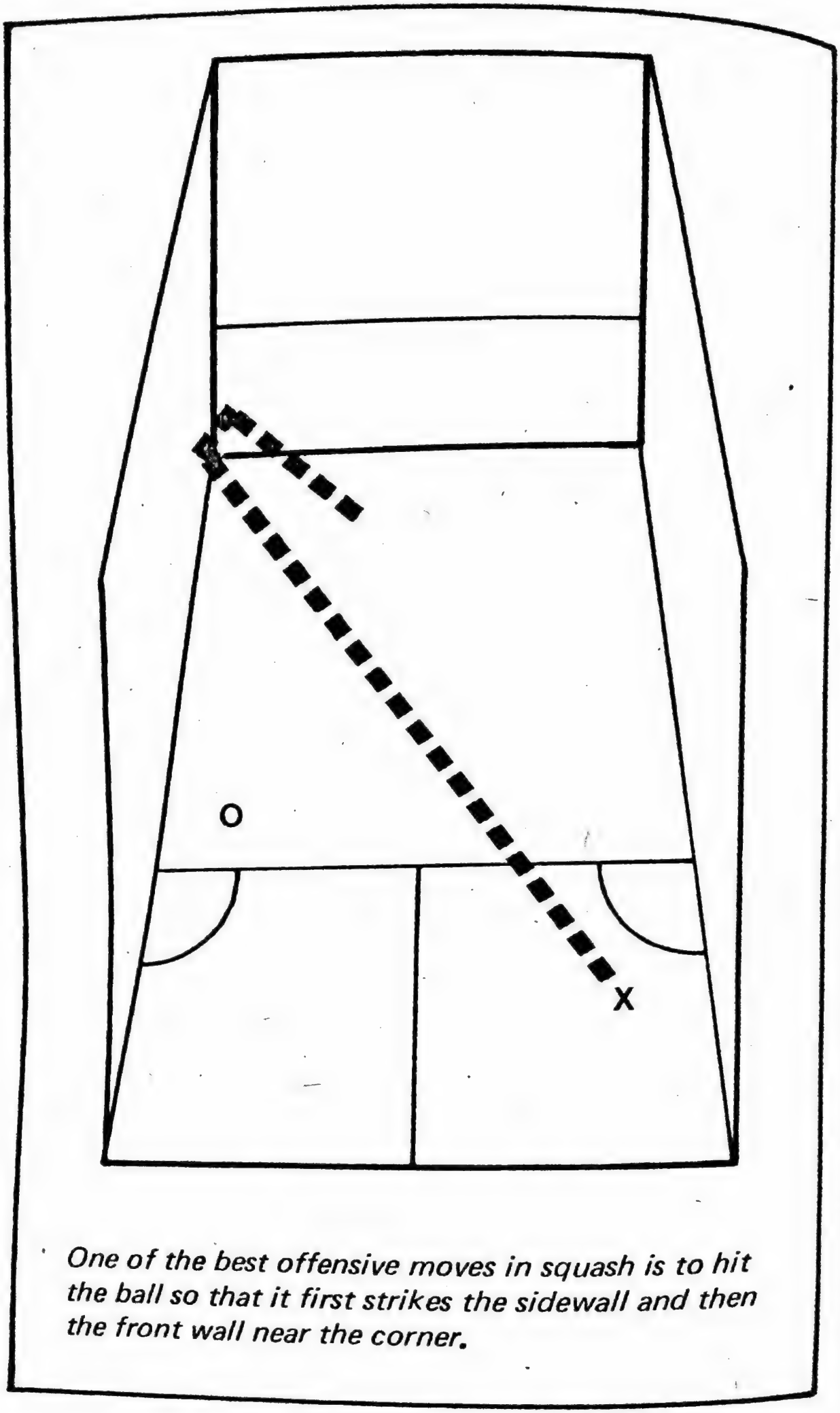
In real squash, the corner shot is one that hits the sidewall and then the front wall, bouncing off at a tricky angle.



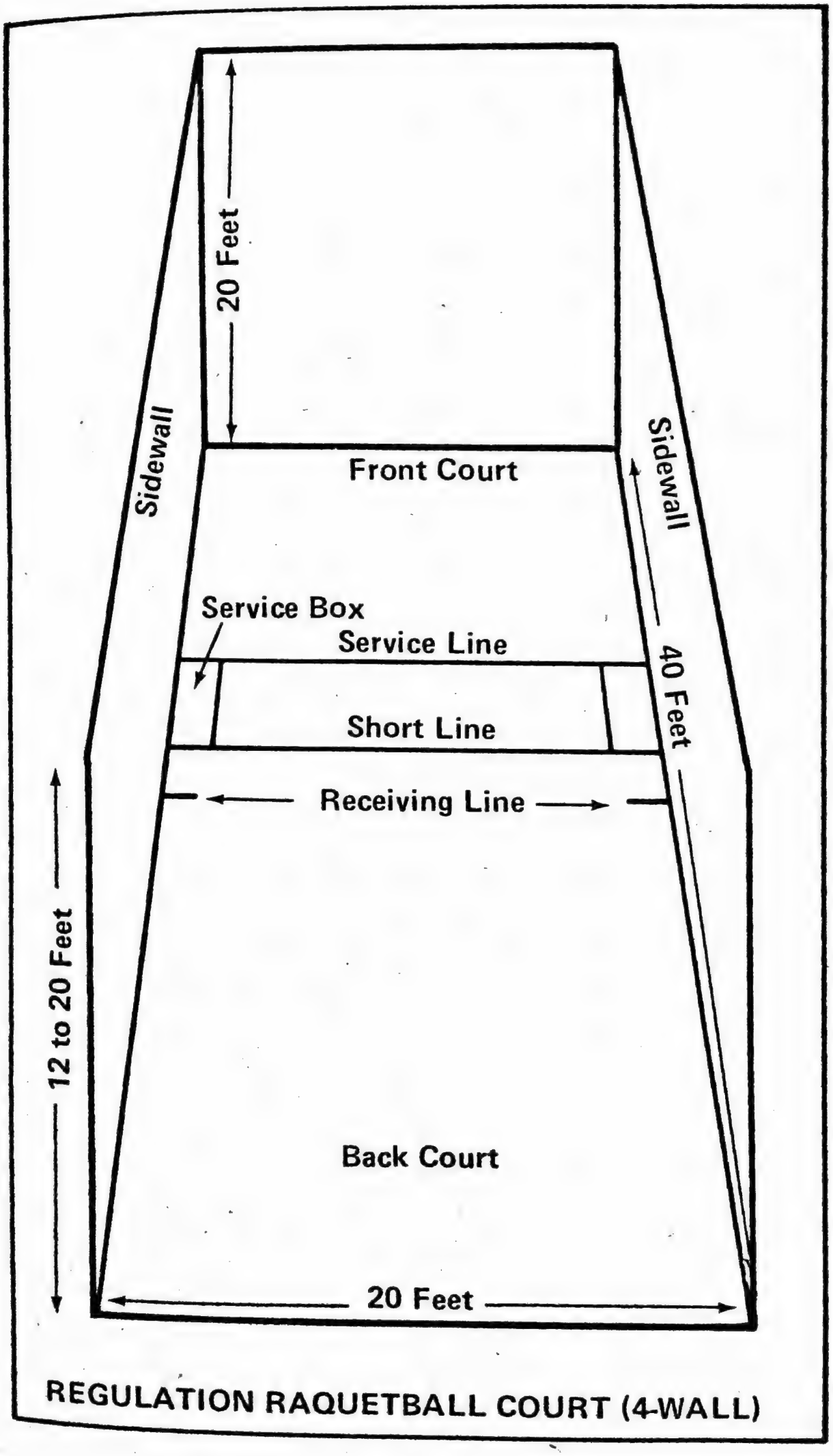
The backhand corner shot in squash sends the ball against the opposite sidewall in such a way that it rebounds off the front wall at a very sharp angle.



In the genuine court game of squash, the crosscourt shot sends the ball off of the front wall and into the sidewall so that it ends up at the rear of the opposite side.



One of the best offensive moves in squash is to hit the ball so that it first strikes the sidewall and then the front wall near the corner.



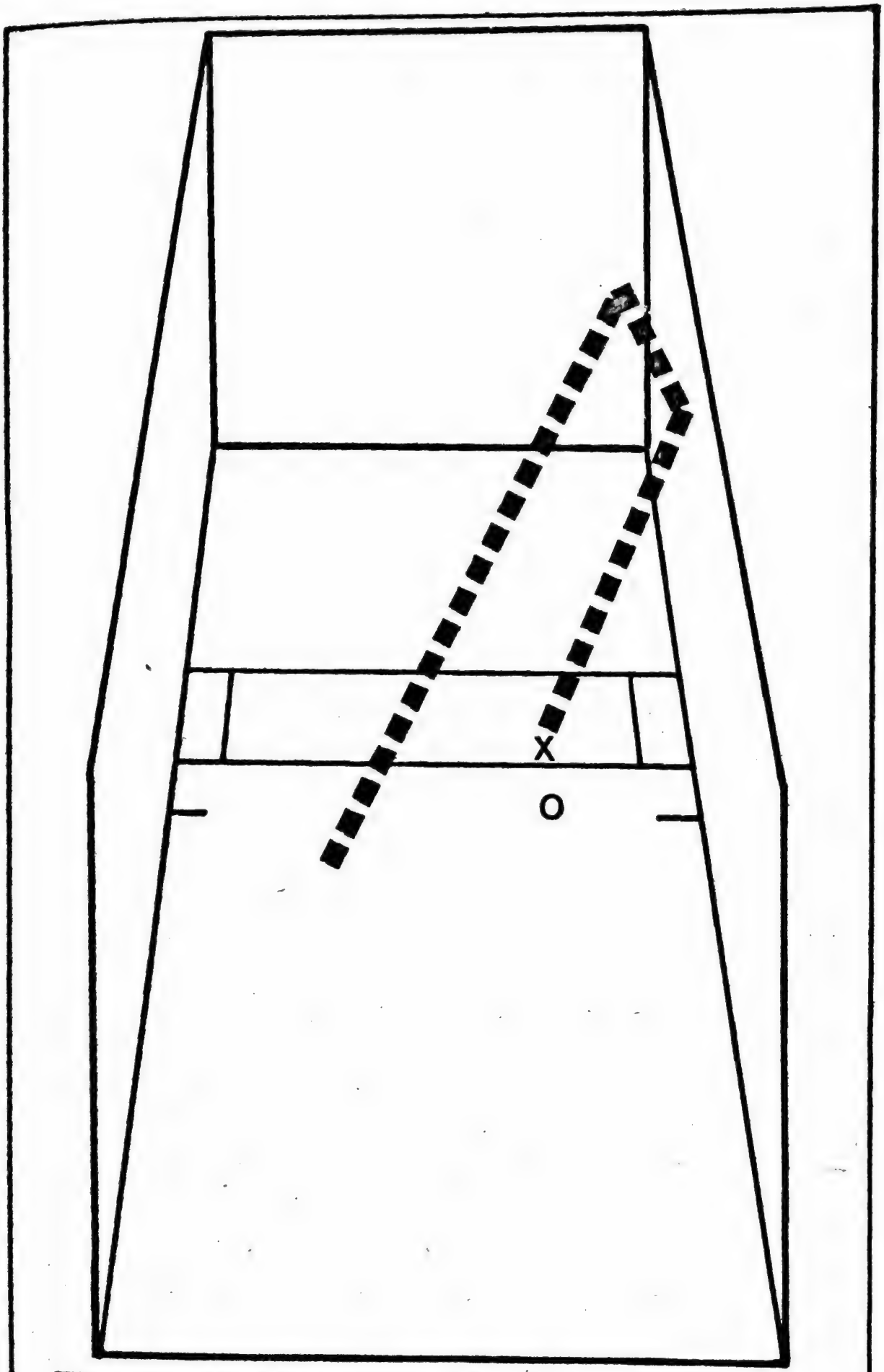
REGULATION RAQUETBALL COURT (4-WALL)

one similarity between the video version and the genuine sport. A four-wall game played with racquets smaller than those used for tennis, squash is a simple enough game to understand. The ball must be hit so that it first strikes the front wall between a service line and a top line. The rebounding ball can then hit one of the side walls, the back wall, or the ground, depending on the angle and force applied. The person whose turn it is to hit the ball must do so before the ball bounces a second time on the ground. Of course, a player can hit the ball before it touches the ground.

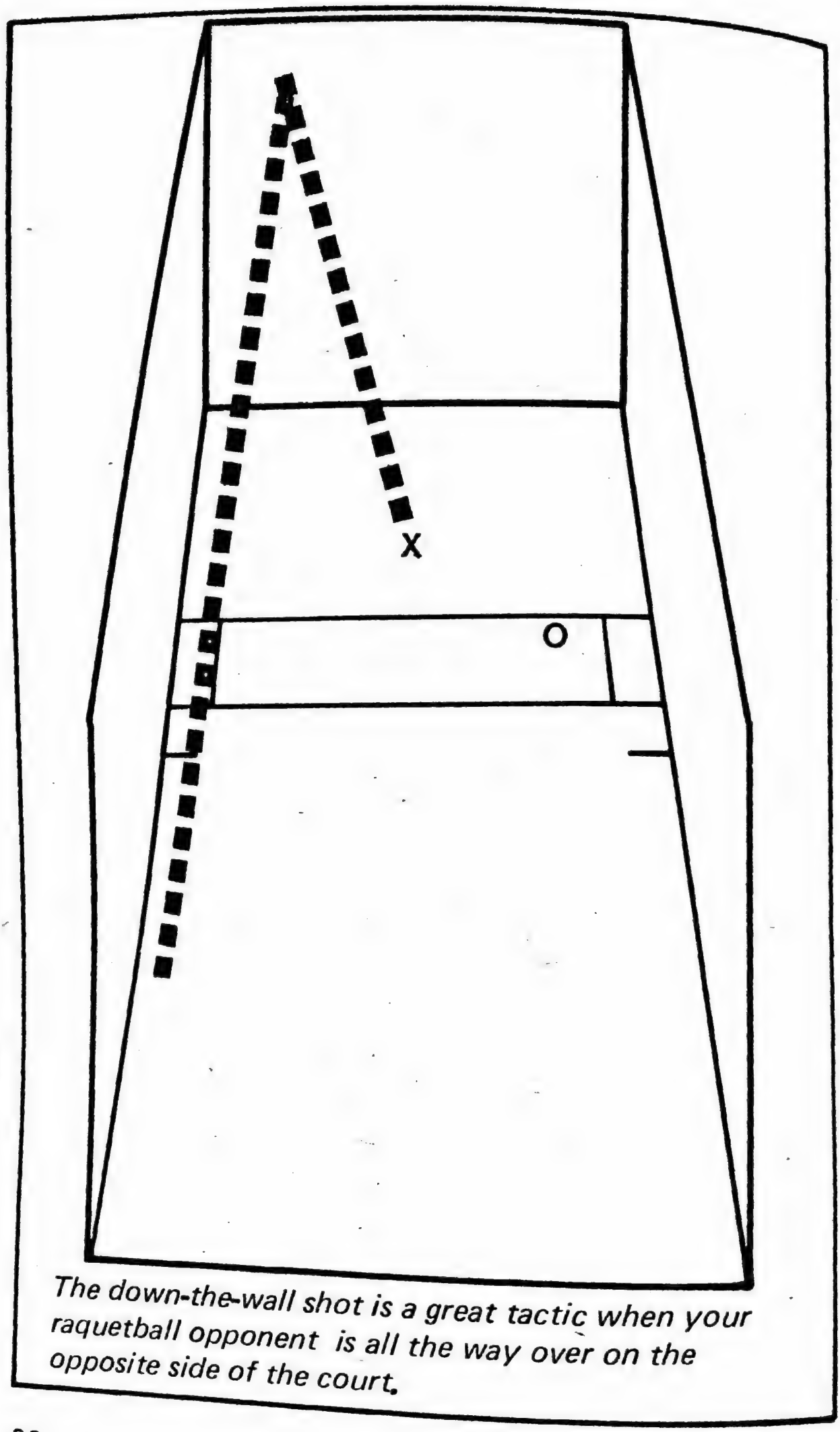
Racquetball is a similar game. Developed in 1950 by a squash player seeking a substitute for paddleball, racquetball utilizes a racquet the size of a paddleball paddle but with strings. There are a variety of rules for this game; for example, there is a four-wall racquetball game as well as a one-wall game, the latter being similar to handball. The four-wall version is very similar to squash, but the ball must bounce before it hits the back wall. The game can also be played on three walls, which makes it more akin to the TV video game.

In video squash a wall is displayed at one end of the screen, while two "racquets" are positioned at the other end of the court. Ball contact, rebound angles, and speed are the same as in the other TV games. Strategic moves are similar, too.

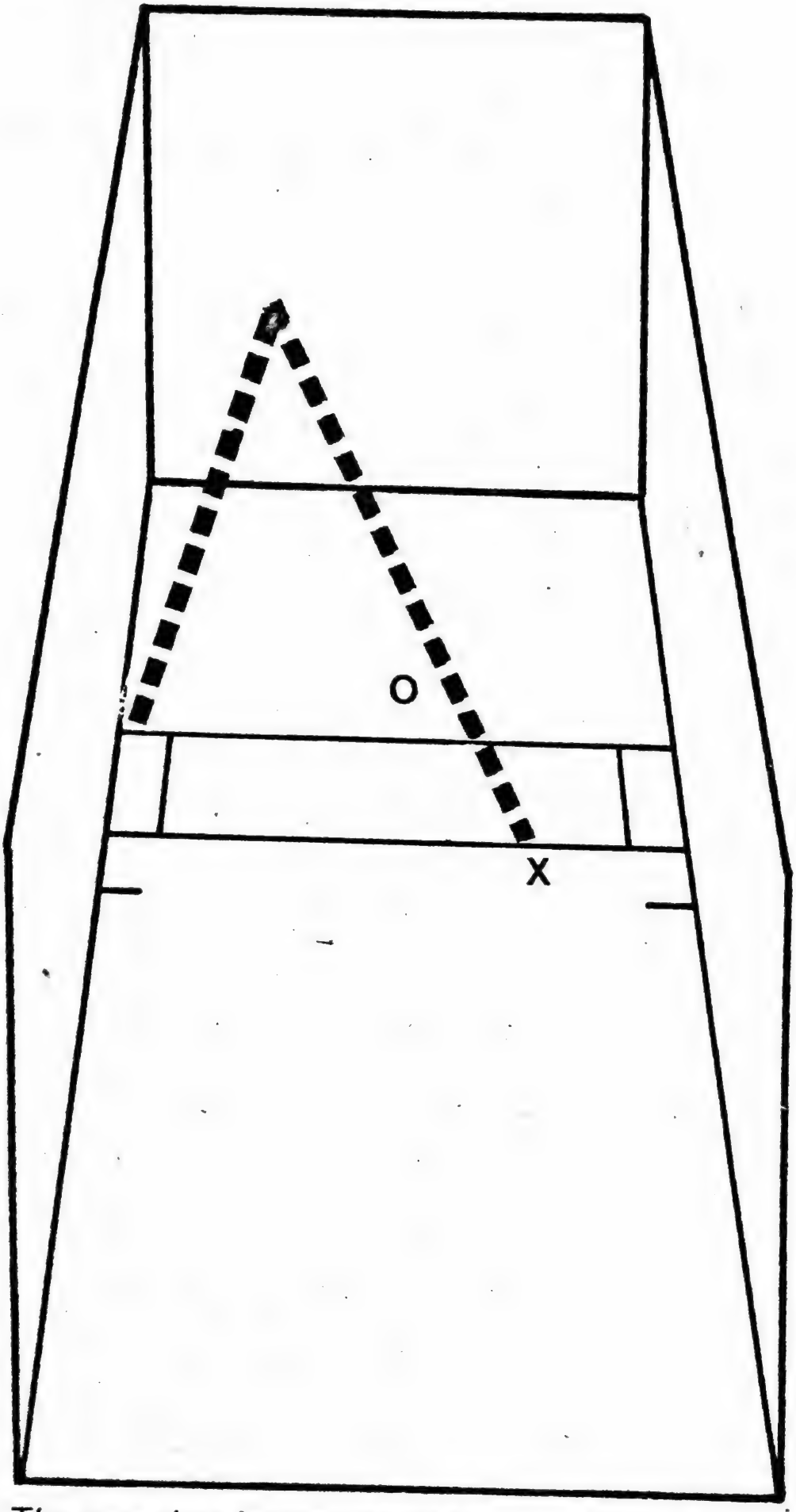
If both racquets are visible on the screen



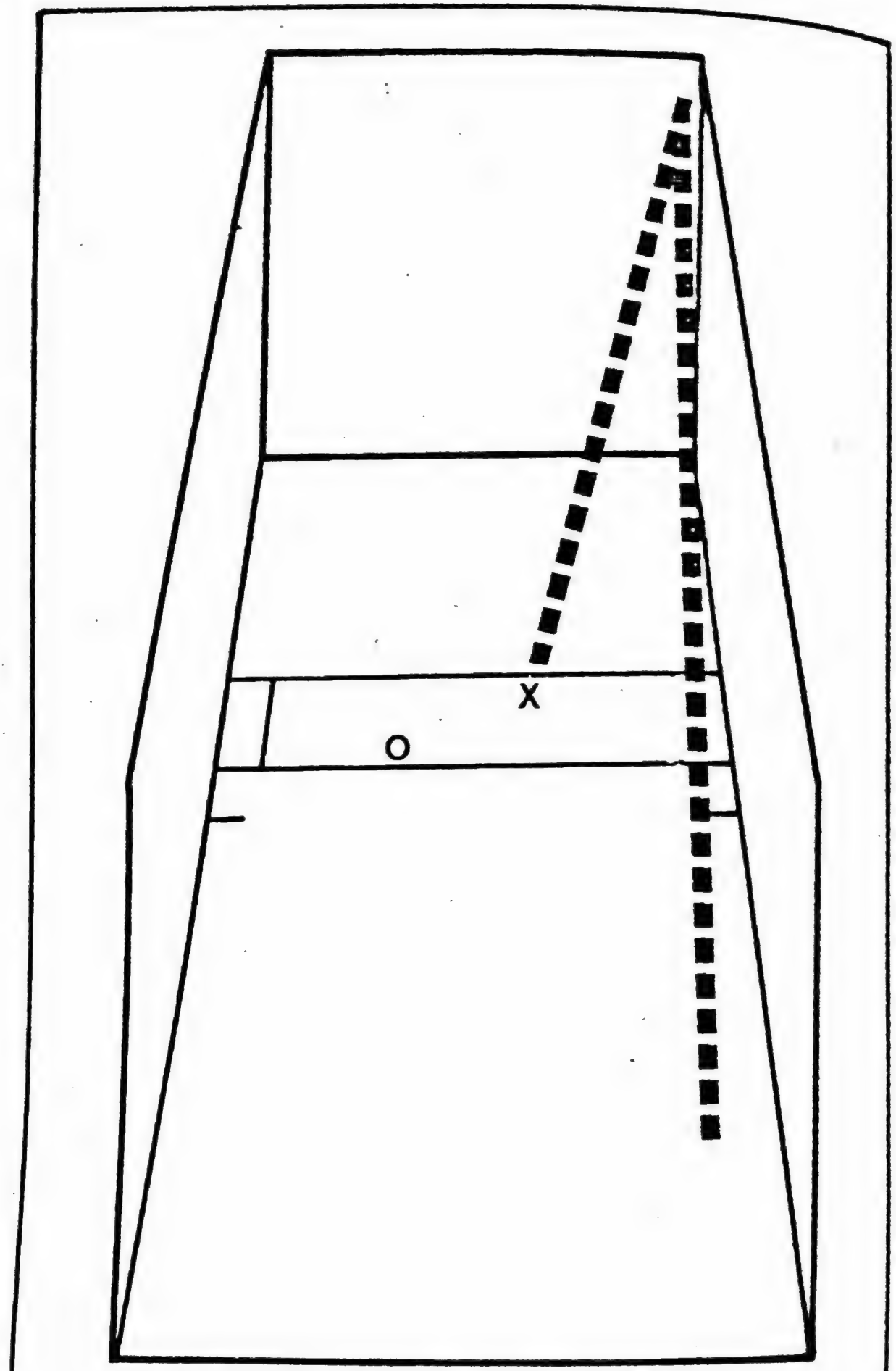
The pinch shot in raquetball is a two-wall hit that forces the opponent to chase a ball going away from him or her.



The down-the-wall shot is a great tactic when your raquetball opponent is all the way over on the opposite side of the court.



The pass shot in raquetball is very difficult for an opponent standing in the front court to return.



The more you make your opponent move to the ball, the better the chances that he or she will miss it.

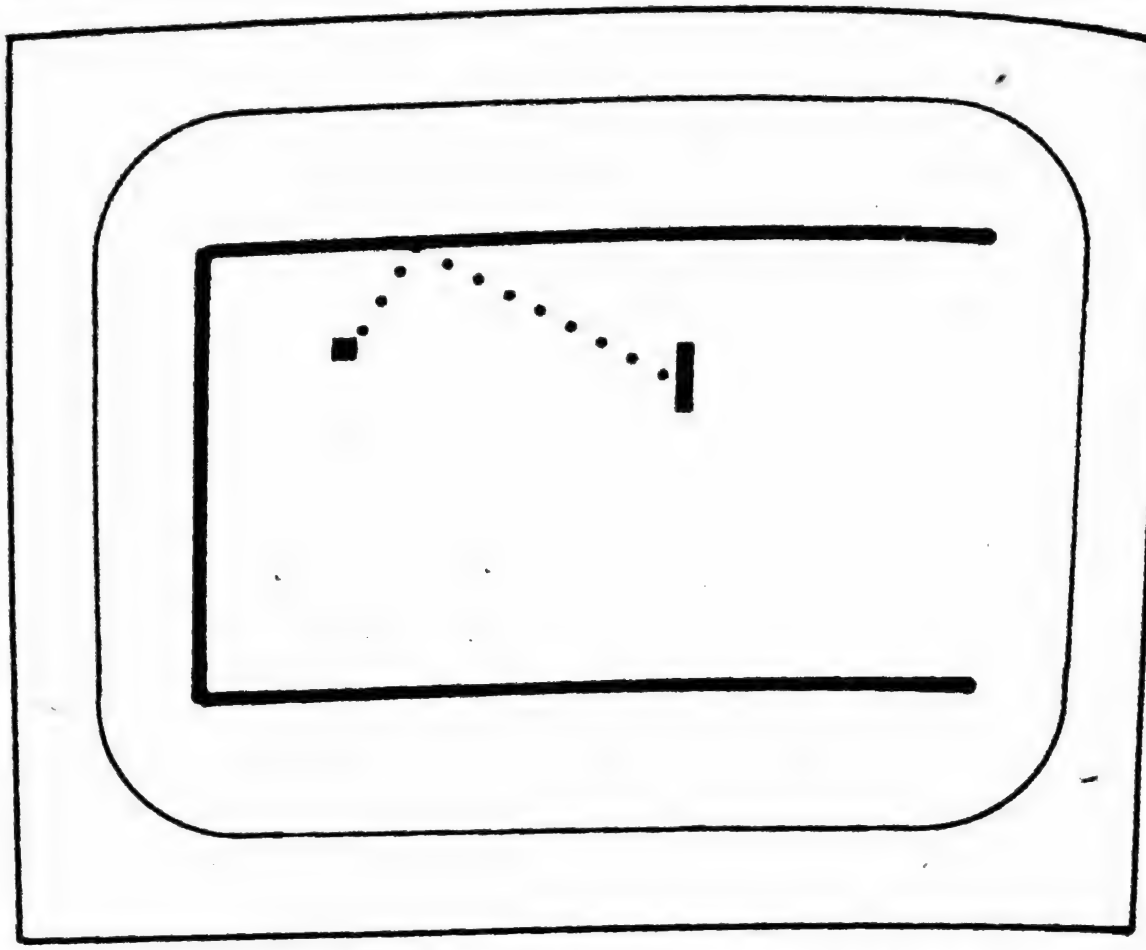
at the same time, move your racquet into the path of the ball even if it is not your turn to hit. Although the ball will go right through your racquet, the obstructionist tactic will throw off your opponent. In addition, do not hesitate to move your racquet up and down in front of your opponent's racquet to break his or her concentration.

Try to hit the ball so that it rebounds to an area that requires your opponent to make a major racquet move. The more you make your opponent move to meet the ball, the better the chances that he or she will miss.

Whereas a ball loses speed during real play when it rebounds off a second wall, that is not true in TV squash. Therefore, take advantage whenever possible of the extreme reflection angles that can be achieved by making the ball hit the two walls before it enters your opponent's territory.

As soon as you see a ball following a certain path, move your racquet into position. Do not pause until the last moment. If you are there early enough, you can position your racquet for a desired angle, placing the ball where your opponent will have a hard time reaching it on his turn. All in all, TV squash tactics are essentially the same as those for TV tennis, except that the players face a common wall instead of facing each other across a net.

Practice is particularly important in sharpening your video squash skills. Many



The video practice game removes one of the squash raquets, leaving one player to hit the ball.

games even include a "practice" position on the game selector knob that simply removes one of the squash racquets, leaving one player to play against the wall (or the machine). The practice function is sometimes called "pelota."

Although your real-game reaction time, tactical moves, and overall strategy can be greatly sharpened by practicing with a TV electronic game, there are decided limits to what can be achieved. For genuine on-the-court expertise, you will have to put in many hours of on-the-court practice.

Video Game Test Reports

THE ELECTRONIC VIDEO games currently available share a great many features in common. Games typically conclude when one player wins 15 points. Virtually all games display scores digitally on the face of the TV receiver, generally right after a point is won. The score then disappears just before another ball is served. Ball serving is done automatically, and the ball rebounds at an angle when it strikes the end section of the paddle.

Unless otherwise indicated in the following test reports, all models are battery-powered, but they can be used with an AC adapter cube that plugs into a standard AC home electrical outlet. Batteries are seldom included.

There are several types of adapters and one is not necessarily interchangeable with another. But all have a line from the adapter that plugs into the video game machine. One word of caution: Be sure, for safety's sake, to plug the line cord directly

into the video game's jack before inserting the two-prong end into the wall receptacle. Prices range from around $4.00 to about $7.00, depending on the manufacturer.

All of the games featured in the following test reports carry the type approval of the Federal Communications Commission. Therefore, none of them should ever interfere with anyone's television reception.

Despite all the similarities, though, there are many things that can distinguish one TV game from another. These test reports, based on in-depth inspections and hours of actual playing time, are designed to clarify the differences that do exist for the benefit of the millions of people who will become video game purchasers during the months ahead.

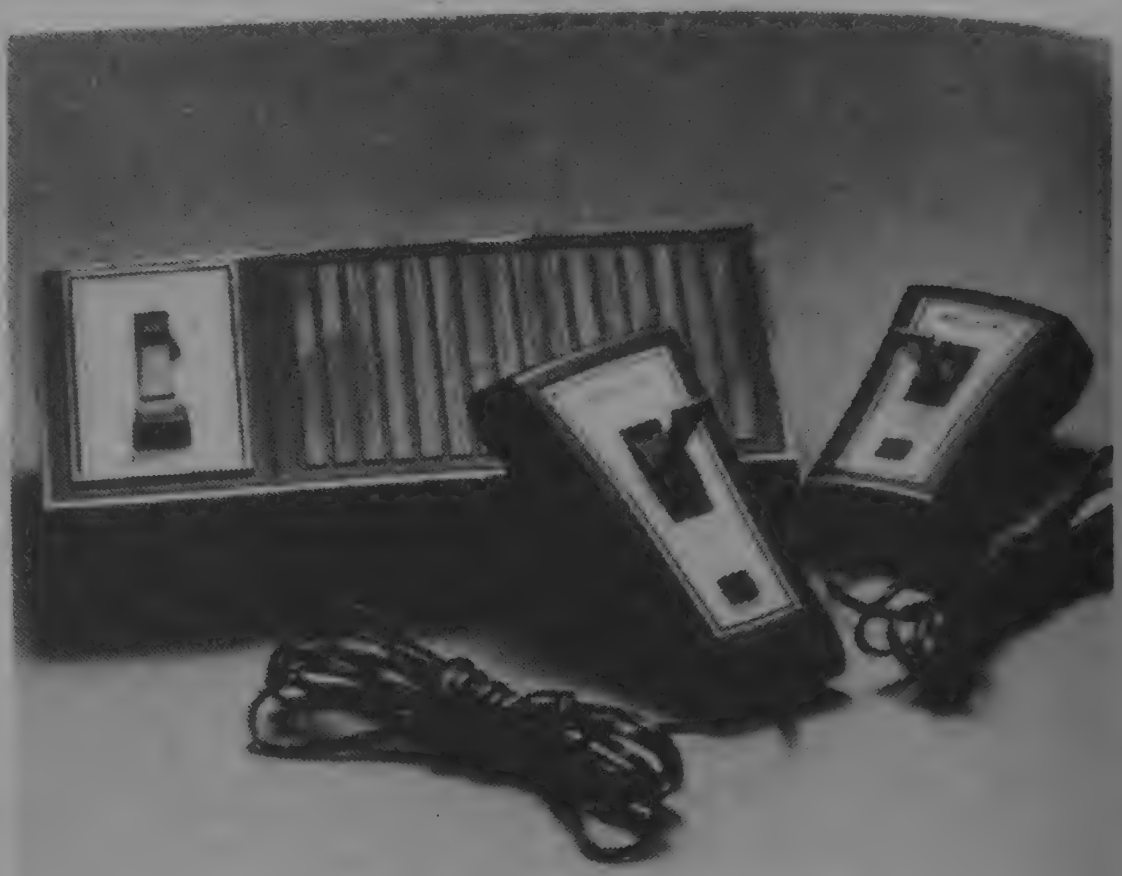
MONTGOMERY WARD VIDEO WORLD OF SPORTS

Adversary Model 370

National Semiconductor Corporation
1177 Kern Avenue
Sunnyvale, California 94086

NATIONAL SEMICONDUCTOR Corporation is one of the major suppliers of integrated circuits, selling them to other companies and using them in National Semiconductor's own consumer products, which include digital watches and calculators in addition to the Adversary video game.

Adversary is one of the few TV video games that displays colors when played on a color TV receiver; naturally, it comes on in black and white on a non-color TV set. Its control deck is small, measuring 9-1/4-inches wide by 5-1/2 inches deep by 2-1/2 inches high. The cabinet is most attractive; simulated walnut wood strips cover almost 75 percent of the black face. Orange letters on a silver background are employed in the on/off and game-selection area of the control deck, while two lever-type remote controls are permanently attached through about nine feet of wire. The sleek-looking lever controls are a welcome change from



ADVERSARY MODEL 370

the rotary potentiometers. A game reset button is located on the control, too. The control deck is generally placed atop the TV console, while players can spread out in comfort with the remote-control units in hand.

Adversary has no built-in speaker. Instead, it utilizes the TV set's speaker and volume control.

Adversary features four games: tennis, hockey, handball, and practice. Games are selected in succession by depressing a pushbutton, but there are no markings to

indicate which game is chosen. A slide switch located under the main unit's front side changes play from two participants to one.

Since the IC chips used in Adversary are different than most, it is not surprising that the game itself possesses some unique attributes. A prime example is that each player is able to select one of three different paddle sizes. Thus, one player can give another a handicap. To accomplish this, a player positions a paddle at the top of the TV screen and then presses the reset button on the remote control. This changes the paddle size to medium (half the large size with which each game always starts); depressing the button again halves the paddle size once more. Ball speed automatically doubles after about four volleys.

When displaying hockey on a color TV set, the Adversary playing field is blue; paddles representing players are yellow as are the borders that outline the ends of the playing field; the puck is white. An interesting twist can turn the Adversary hockey game into something like an obstacle course with the machine automatically moving three paddles on each side while the goalies remain under the control of the players. The large-size paddle (or hockey stick) covers half the goal opening. Guards, in turn, are 1/5th the size of the goalie's

stick, and they remain the same size even when the goalie is reduced in size. Interestingly, the guards can hit the puck on both sides of the stick. When the control-deck switch is moved for one-player operation, one of the remote-control levers operates the movement of both goalies as if they were connected.

For Adversary tennis the playing field is green, while the area beyond the field's borders is blue. The net is yellow, as are the racquets or paddles. The ball, of course, is white. When set for single play, both paddles move in unison.

For Adversary handball (or squash), the three-sided playing field is green, with a yellow "spectator" area beyond the field. One paddle is blue and the other is reddish. During singles play, only one paddle appears at a time, each one taking on its appropriate color — blue or reddish. The latter colors also appear in the digital on-screen scoring.

One can practice or play against National Semiconductor's Adversary by placing the player number switch in the singles position. For solitary operation, both paddles are controlled by one player. To play against the machine, one can move one of the paddles off screen. Or, when playing hockey, one of the goalies can be stationed in front of the goal, leaving just enough room to sneak a puck through.

A player can take a time-out, too. Simply move a paddle off the screen after a point is scored by the player serving the ball. The digital score remains on the TV screen, disappearing when the paddle is moved back into view on the playing field. Adversary is one of a very few games, if not the only game, possessing this time-out function.

Another interesting facet of Adversary is that the ball is served right from the paddle; other games have the ball come bounding into view either from half court or from some end court position. Consequently, Adversary provides the players with some control over where the ball will go on a serve.

A slide switch for changing game operation from channel 3 to channel 4, should that prove necessary, is located in a nook under the control unit.

The Adversary game/set switch is unorthodox. Unlike other video game switches, it is not located on the box that is connected to the set's antenna terminals. Instead, the switch is part of a long power on/off switch located on the game itself.

The only disturbing aspect of National Semiconductor's Adversary game is that the AC adapter gets uncomfortably hot and it stays hot after the game is turned off.

Whereas most games carry a 90-day warranty covering defects in manufactur-

ing, National Semiconductor provides an additional 275-day warranty involving a flat $10.00 charge.

CONCLUSION: Adversary by National Semiconductor Corporation is an all-round top-notch unit among the higher-priced video games.

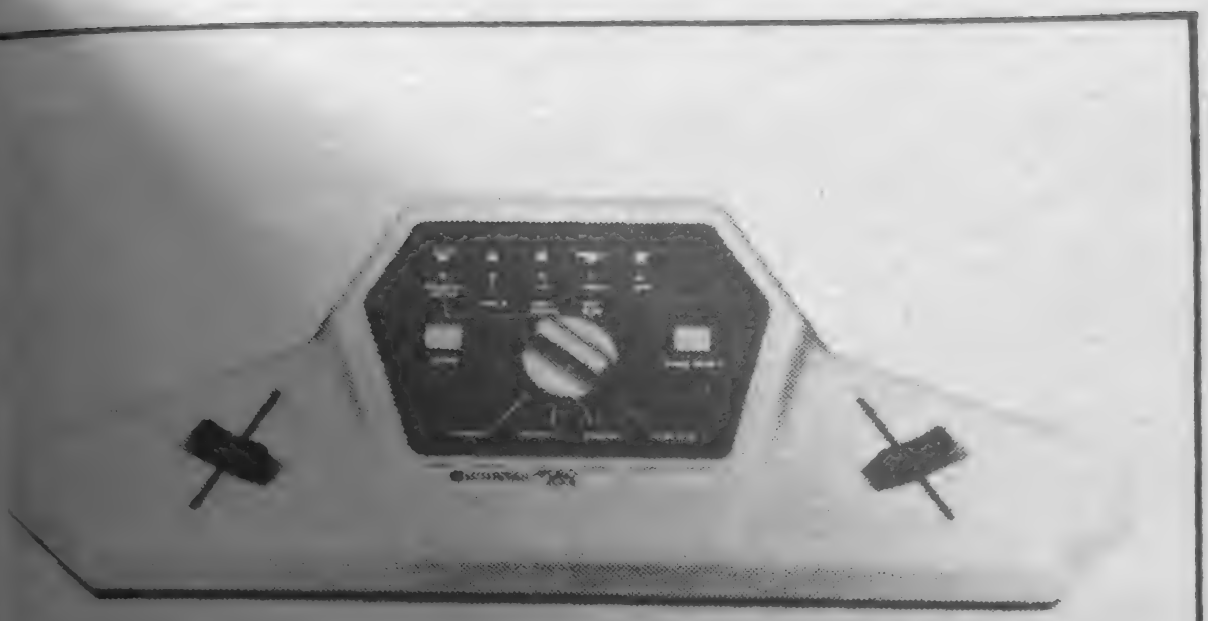
Apollo 2001

Enterprex
970 N. Broadway
Los Angeles, California 90012

THIS NEATLY PACKAGED electronic game (also sold nationally in Radio Shack stores under the "TV Scoreboard" brand name) offers all the standard two-player games and a practice function. A rotary selector switch allows a choice of tennis, hockey, squash, or practice.

The playing field is composed of white-dotted horizontal lines for side walls or boundaries (across the top and bottom of the screen) and solid vertical lines for the tennis net or goal walls. Apollo 2001 produces only black-and-white video pictures, but video quality is quite good.

The unit's moderate size makes it easy to store away, although its dimensions work against two adult players being able



APOLLO 2001

to operate it comfortably. The angled slide controls at each end section of the machine, however, ease the problem. Measurements come to 14-1/2 inches long by 6-1/2 inches deep by 2-1/2 inches high (plus the height of knobs); at one point, the paddle slide controls are only seven inches apart.

The control deck of the Apollo 2001 is an attractive tan and brown, with brown knobs and tan controls. Overall construction is good, although the small plastic toggle switches are more likely to break than metal ones would be. There are five of these toggle switches lined up at the top of the machine for selecting automatic or manual serve, 40-degree or 20-degree

bounce angle, high speed or low speed, small paddle size or large paddle size, and power on or off. Two large square pushbuttons handle the reset and manual serve functions.

When the hockey game is selected, a larger-than-usual goal opening appears. The goalie stick (large version) is one-third the size of the opening; the small stick is one-half the size of the large one. The goalie, of course, is positioned near the goal opening and moves vertically to block any puck in the area. The forward is near the center line in the same half and moves in unison with the goalie.

When the speed selector is in the slow-speed position, it takes about two seconds for the puck or ball to traverse from one end of the court to the other end. In the fast position, it takes only about one second. Fifteen points win in any game, and the reset button must be depressed to start a new game. The ball continues to be served even after a player's score reaches 15, but the ball goes right through any paddle which happens to intersect it. The same thing happens — the ball going right through the racquet as if it were not there — during a game of squash or handball when a player hits the ball out of turn.

There are three differently pitched "pings" that can be heard when the ball or puck is served, makes contact with a pad-

dle or stick, or bounces off a wall. The speaker is inside the game machine, positioned underneath the case.

The Apollo 2001 features a good, sturdy, FCC-approved game/set slide switch with a cable that is almost 15 feet long. It requires six "C" batteries and has a red pilot light to indicate whether the machine is on or off — a good feature that most TV games lack.

CONCLUSION: The linear slide levers for moving the paddles or sticks provide each player with good control. In addition, the diagonal path that the levers traverse is just right, and the knobs with finger indentations are comfortable. All in all, the Apollo 2001 offers excellent value for the money.

Colorgame Action Games No. 7650

Intercon Marketing Corporation
3250 Victor Avenue
Santa Clara, California 95050

THE SAME BASIC game as Adversary, Colorgame Action Games #7650 uses National Semiconductor's three-chip family for full color operation. It looks different, though. The control center measures 12 inches wide by 6-1/2 inches deep by 3 inches high and has two recessed wells in which are contained the 3-1/2 inch by 2-1/2 inch remotes. The reset button is a red pushbutton. The player control, a 1-1/2 inch knob rather than a lever, is easy to manipulate and hold.

The cabinet is a bright yellow and black. A three-foot lead goes to the matching transformer that connects to the TV set's antenna terminals through a few inches of 300-ohm twin-lead wire. The one- or two-player slide switch is located on the face of the game, in contrast to Adversary's less accessible underneath position. Operation, however, is identical to that of Adversary,

as is the 275-day limited warranty.

CONCLUSION: Sometimes sold under the brand name Gemini/Colorgame, this unit is so similar to National Semiconductor Corporation's Adversary that potential Adversary buyers should investigate the Colorgame #7650 before they make a purchasing decision. The only defect noted in testing was a picture that was frequently snowy; interestingly, that snow also occurred on regular TV channels when the game switch was in its off position.

FACE-OFF

Executive Games, Inc.
Dorchester, Massachusetts 02124

FACE-OFF IS a video game presenting a few unique features. It does not offer a tennis or handball game; it does not display the score on the face of the TV screen (the scores are maintained electronically right on the game's face panel, with numbers for "Home" and "Visitor"), and the winning player is the first to reach eight points on the LED scoreboard rather than the almost universal 15 points.

Switches include power on and off, soc-

cer or hockey selection, expert or novice play (player size is cut in half for experts), and game reset. When a player reaches eight points, the action continues but the score does not change.

The play area on the TV screen is rectangular, except for a protruding goal section (not just a wall opening) at each end. When a point is scored, the extended goal area disappears in a contracting motion, then reappears. Hockey sticks — one for each player — are black and white, while the puck is black. The playing field is gray.

Face-Off is limited to two games hockey and soccer — but do not let that turn you off. The games are much different than the other video hockey/soccer presentations and much more exciting.

There are two player controls. Neither lever nor rotating types, they are, instead, "joysticks." With these controls the players can move smoothly all over the playing field in any direction. A player's position is governed by the position of the joystick: push it forward and the screen player will move up on the screen, back and the player moves down, right and the player moves to the right, left and the player moves to the left.

Unlike in other hockey games, the Face-Off puck is retained when it makes contact with a stick. The player having possession of the puck can then skate

toward the goal and try to score a point. If the defender catches this player in time and makes contact with his stick, the puck is dislodged, careening off walls, etc. But that's not all! Face-Off has a firing button that permits the hockey player who is skating with the puck to shoot it at the goal. When a goal is made, the puck disappears for a few seconds and then reappears at center ice. Face-Off emits a high-pitched sound when a point is registered and a lower-pitched sound when the puck hits a wall.

Puck direction is not determined by the particular section of the stick that hits it. Rather, the direction that the stick is traveling determines where the puck will go. The joysticks enable a player to move in any direction at any speed up to the fast 1-1/2 seconds per full horizontal or vertical court travel.

The novice stick covers almost all of the goal area, while the expert stick covers only about 1/2 of the goal area. The puck, which is normally about 1/3 the size of the stick, also comes down in size when the play switch is moved to the expert position.

The Face-Off soccer game is similar to the hockey game of most other video games, since the ball (which turns to white) is hit or kicked and cannot be held by a player as in this unit's hockey format.

Face-Off does not operate on batteries; it

works only off a home's regular AC power supply. Therefore, there is no AC adapter to purchase separately. The line cord supplied is about 5-1/2 feet long. The game itself measures 18 inches long by 8 inches deep by 3 inches high, plus the height of the joysticks. The game/set switch is the bulkiest one around, measuring 2-1/2-inches square by 2-3/4 inches deep. Two little ears with screws protrude to accommodate the twin-lead wire from the TV set's antenna. The leads that go from the switch box to the TV set's antenna terminals are about 5-1/2 inches long.

The Face-Off unit itself has an ivory leatherette covering and a black and silver paper facing. There are no provisions for changing the channel from 3 to 4; according to the instruction manual, it should be set to play on channel 3, but the test model could only be operated on channel 4.

CONCLUSION: Face-Off is an exciting and different type of video game. It deserves serious consideration by anyone who plans to purchase a game in the near future, and it should prove especially attractive to hockey fans seeking realistic sports action in an animated format.

Fairchild Video Entertainment System

Fairchild Camera and Instrument Corporation
4001 Miranda Avenue
Palo Alto, California 94303

TOMORROW'S TV GAME is here today! Called the Fairchild Video Entertainment System, it consists of a master console and two remote controls. The console, which looks like a small tape recorder, accommodates what appear to be eight-track tape cartridges. Fairchild calls them "Videocart" cartridges, and they are not magnetic tapes at all. Instead, they are special electronic memory circuits that make connections with the console's inner electronic workings to produce a multitude of video games.

The game displays are shown in full color (on a color TV set, of course) or black-and-white on a monochrome TV receiver. Color is superb, and the contrast between the players and the playing field is exceptional.

Two games are built into the console:

hockey and tennis. The first add-on cartridge Fairchild offered was one that incorporated four games — tic-tac-toe, shooting gallery, doodle, and quadradoodle — the latter two being full-color electronic tracing games for small children.

The handsome brown/black/tan console is actually a microcomputer of sorts. It contains the Fairchild F8 microprocessor and four solid-state random-access memories (RAM's) that permit the machine to save information digitally and read it out when called upon to do so.

FAIRCHILD VIDEO ENTERTAINMENT SYSTEM

FAIRCHILD VIDEO ENTERTAINMENT SYSTEM

The console is connected to a television receiver in the standard manner with an FCC-approved set/game switch. There are four tan control keys on the console, plus a reset score key. A game cartridge slot, similar to the one on an eight-track tape cartridge player, is situated at the right-hand side.

The console controls include adjustable ball speed, variable game time-length limits, and a game freeze so that a player or players can take a break and resume the action later. The remotes, which resemble the plungers on old-fashioned bomb detonators, may be placed anywhere up to

eight feet from the TV receiver. Atop each is a triangular-shaped player control that can be rotated, pushed left and right, or pushed and pulled in and out. It takes some practice before one is totally familiar with these remote controls.

In tac-tac-toe, the player competes against the machine; the player has the X's and the machine has the O's. Either hand control can be used. A dot in a square acts as a pointer to indicate where the player is. To place an "X" in the square where the dot is, the player pulls up on the remote-control's plunger and then presses down. The "X" then appears in the selected square. The machine quickly responds by placing an "O" in another square and the words "YOUR TURN" appear on the TV screen. If the player does not want to put his "X" in the square where the dot is, he or she can move the hand control to the left or right. The dot will move horizontally until it reaches the end of the squares; it then automatically cycles to the next line. When the dot reaches the square among the nine that the player wants, he or she merely pulls up the plunger and presses it down. The "X" immediately appears in living color. And so it goes until either the player or the machine wins. If the player loses (and the machine is a first-rate player), the message "YOU LOSE TURKEY" appears on the screen.

FAIRCHILD VIDEO ENTERTAINMENT SYSTEM

The Fairchild hockey game is different than other TV game versions. With Fairchild's, the goalie moves up and down as in other games, but the forwards can move all over the field. In addition, stick angles are adjustable.

The players' scores are maintained, digitally, on the extreme left and right bottom portion of the screen. In between is the elapsed time, also displayed on screen. Contestants can choose two-, five-, or 20-minute game periods. Games stop at the end of the period chosen, with the winner being the person with the highest score at that time.

Shooting gallery starts with the screen showing "S?" — asking a single player if he or she wishes to start. The game can be

activated either with no time limit and an average speed or with a time limit and one of the other speed options. A rifle is positioned at the left of the screen and a moving target is shown at the right of the screen. The object is to shoot the target, of course, which is accomplished by plunging the hand controller down at the proper moment. If the target is hit, the score registers on the screen and the rifle's position automatically changes. On the right side of the screen the number of shots fired is shown, while on the left side is the number of hits made. Top score is 99 points, at which point the score recycles to 00 again. Either hand control can be used in this single-player game. For two-player shooting gallery, competitors can use a score basis or score and time format.

The doodle game starts with one dot appearing in the middle of the screen and another at the lower left-hand corner. The center dot is the one the participant controls, while the other simply changes color to indicate what color trail the machine will leave when the center dot is moved. Moving the hand control forward and backward moves the indicator dot up and down on the screen, while moving it left and right makes the screen dot move from side to side.

One of three colors — red, green, or blue — can be chosen by rotating the hand control with a quick twist to the right. Another

quick twist to the right produces another color. A quick twist to the left enables the indicator dot to erase whatever it goes through, while pushing the plunger down erases the entire screen.

Quadradoodle works similarly except that it offers three different size lines, and the control procedure is somewhat different. Both doodle and quadradoodle can create pretty color patterns and drawings on the screen, and children enjoy playing these games just as the adults like the more competitive Videocart cartridges.

With Fairchild's video blackjack game, one can either play against the machine or against another player. Players start with $500 in the kitty, but they cannot bet more than $99 at a time. If a player attempts to bet more than $99, the machine automatically drops the bet to $10. Cards for the dealer (machine) and one or two players appear on the screen. Each player's score (in dollars remaining) is maintained at the top of the screen, while the bet amount chosen by each player through his or her hand control is displayed at the bottom part of the screen. The question, "Hit?" appears on the screen every time a player has to make a decision to draw another card or stand pat.

The Fairchild "Desert Fox" game is tremendously appealing due to its action-packed maneuvering tactics. In this two-

player game each participant controls a tank on a battlefield. The battlefield is broken up by safety zones (an "L" and an inverted "L" located in the lower right-hand corner and upper left-hand corner of the TV screen, respectively) and by a group of land mines.

A player moves the tank by pushing the hand control forward, backward, left, and right. The tank can be revolved, too, by twisting or rotating the control. Revolving the tank is an important aspect of the game because the tank's cannon shoots in a fixed line. Consequently, a player must aim the entire tank at the other player's tank before pushing down on the control to let a shell fly.

Should a tank run into one of the mines, an explosion occurs, with a flash on the screen just like the one when a tank is hit by an opposing player's cannon fire. The tank changes colors in quick succession, giving the effect of an explosion through the flashing effect.

A player cannot hit another tank that is hiding behind one of the two safety zones. A tank in the safety zone can fire at another tank, however.

Players will probably find it a little awkward at first when they attempt to control the tank's movements. After all, there is the actual moving of the tank in the desired direction, turning the tank around to get its

weapon in line for hitting the other tank, and firing a shell. All of this is further complicated by the necessity to get out of the other tank's line of fire. Furthermore, when a tank is turned in other than a 90-degree position, it assumes a distorted shape, something like a slanted picture. This occurs because when the tank is rotated, the top part shifts more than the bottom part.

Fairchild is planning to release a host of other cartridges, including a mathematics game and one that is reminiscent of the "Star Trek" TV show. In other words, Fairchild plans to provide an expandable video library, to maintain interest.

CONCLUSION: If you can afford it, the Fairchild Video Entertainment System is the way to go. It combines high quality components with the exciting prospect of being able to play a theoretically unlimited number of well-planned and challenging games. In other words, the person who buys the Fairchild Video Entertainment System is not forever limited to a fixed number of games.

The only word of caution to potential purchasers concerns the fact that the game is factory set to play on channel 3. If channel 3 is used for regular television broadcasting in your area, be sure to ask your dealer what can be done before you take the Fairchild Video Entertainment System home.

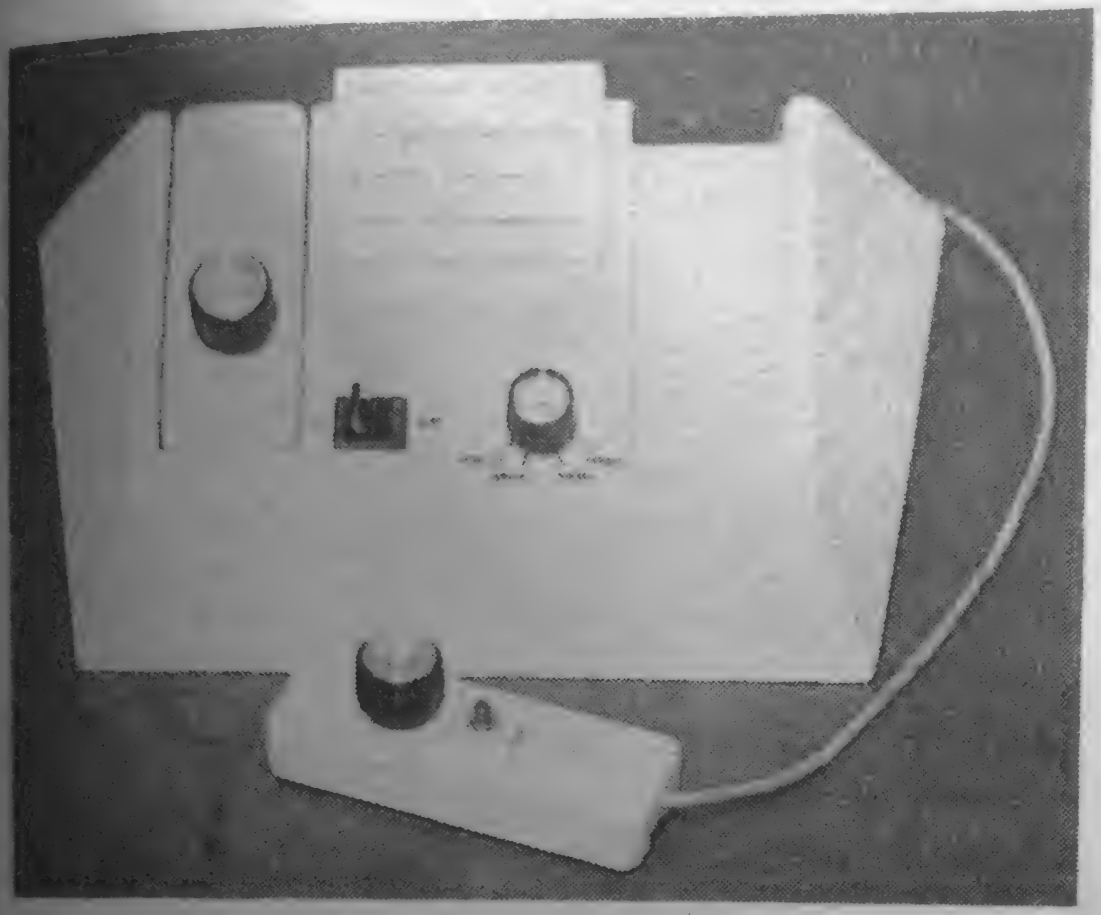
Name Of The Game II

Allied Leisure Industries, Inc.
245 W. 74th Place
Hialeah, Florida 33014

HERE IS A video game that does not have a manual-serve function, a paddle size change, rebound-angle selection, or manual ball-speed change. Furthermore, although it comes with an AC adapter, it cannot function on batteries. Sounds like one you can ignore, right? Not on your life!

Name of the Game II displays color on a color TV set; it has remote controls; and the ball automatically speeds up from very slow to greased lightening. Add to these attributes a hockey game in which the goal opening is more than three times the size of the stick, and you have the makings for a truly fun and exciting video game.

Name of the Game II is set up the same way as Adversary and Colorgame. The game/set switch is on the main control console, the antenna connection device is a balun (matching transformer alone), the AC adapter plugs into a jack on the back, and the TV antenna attaches to the rear



NAME OF THE GAME II

terminals of the game's main unit. But that is where the resemblance ends.

The playing field is delineated by blue borders, the dash-line net is blue, and the hockey puck is blue. Paddles are either green or orange on a red-grayish court.

In the hockey game, the forwards are situated in the middle of the opponent's half of the court. This makes for a more challenging contest. The other games are singles tennis, handball (or squash), and practice. For each, the ball is served by the player who won the last point, and the serve actually emanates from the server's

NAME OF THE GAME I

paddle or stick or racquet. After three paddle hits, the speed of the ball increases from very slow to medium speed. With five additional paddle hits, the ball travels at very high speed, consuming only about 1/2 second as it flies across the screen. Three separately pitched sounds come from the speaker (the set utilizes the TV speaker), depending upon whether the ball hits a paddle, a wall, or scores a point. Sound quality through the TV set's FM audio system suffers from background noise, and many people may prefer to turn the volume down, eliminating the "pings" and "bongs" that provide some of the play enjoyment.

Unlike most video games, Name of the Game II is not over until one player scores 21 points.

Two shallow wells at each end of the console unit contain the remotes. Only one of the remotes has a reset button. To the left of center are the game/set switch and the game selector knob. The name of the game selected appears on a lower ledge, where it is slightly difficult to see. At the bottom of the main unit is a channel 3 and channel 4 switch. The unit itself is not among the more attractive video sets, but play is exciting and the quality of the color is excellent.

CONCLUSION: Name of the Game II is a fun game that is most suitable for persons with highly developed reflexes. The automatic high speed is much too fast for children. Another version, Name of the Game I, allows a choice of speeds and paddle sizes (as well as doubles games and target shooting), but it costs considerably more.

Odyssey 300

The Magnavox Company
1700 Magnavox Way
Fort Wayne, Indiana 46804

ODYSSEY 300 has the same shell as the Odyssey 400 and plays the same games, but it does so with only two paddles. Model 300, as do the other Odyssey games, offers high-quality construction. It lacks the underneath adjustment features of the 400, but it takes the same six "C" cells. A player wins when he or she scores 15 points. At that point, paddles will not make contact with the ball any longer, and the reset switch — which is combined with the on/off switch — must be activated for play to continue.

The 300's controls are set up in the same manner as its big brother's. There is, however, only one control for each player. A skill switch converts the game for expert, intermediate, or novice play. For expert players, the paddle is large and ball speed is fast; for intermediate, the paddle size is small and the ball speed is slow; for novice, the paddle size is large and ball speed is slow. There are four ball-deflection angles (two upward and two downward) for expert and intermediate competitors, but only two for novice. And the novice ball-deflection

angle is quite small, while the expert and intermediate games involve fairly large deflection angles when ball contact is made near the upper and lower parts of the paddle. Even if the ball strikes a paddle dead center, it bounds off in a slightly offset direction.

CONCLUSION: Although not an exceptional game in any respect by today's standards, Odyssey 300 is nonetheless a

ODYSSEY 300

solid performer from one of the top companies in the video game field. Stay away from the Odyssey 100 and 200, though; they are way behind the competition in this constantly evolving area of electronics technology.

Odyssey 400

The Magnavox Company
1700 Magnavox Way
Fort Wayne, Indiana 46804

MAGNAVOX'S TOP game at the end of 1976, Odyssey 400 utilizes the same body shell as the Odyssey 300 and 200, but it boasts hockey, tennis, and smash (handball or squash or Jai-alai) and a choice of two-player or four-player format. The Model 400 is not a color game, however, it shows up as black-and-white on a color television.

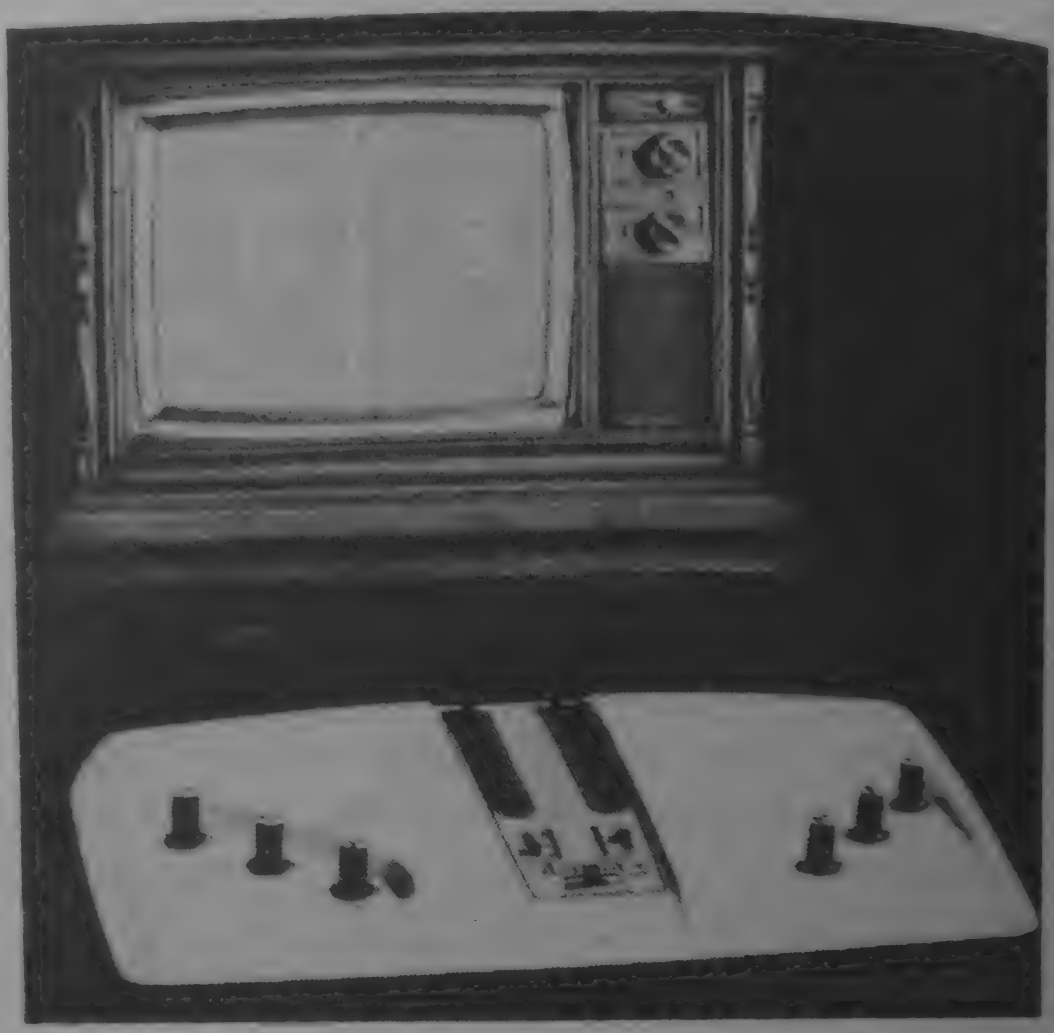
In the center of the flat silhouette body are the setting controls and switches. These include, at the top, two small controls for moving the center line and for setting the speed in smooth gradations (unlike the two-speed change offered in other TV game machines). At the bottom of the 17 x

11 x 3-inch console is a three-position slide switch for game selection (games are designated both by letters and small illustrations), a one- or two-player switch, and an on/off power switch. The player switch is also used to reset the score when a contestant reaches 20 points. When that score is achieved, a letter "W" appears beside the winning player's score.

Player controls are positioned diagonally at each end section of the console. The controls consist of high, easy-to-grasp knobs, with each side having reversed functions. That is, the uppermost control near the left edge of the cabinet is "ball English"; the center control is "horizontal"; and the bottom control (about 1/4 of the way toward the center of the cabinet) is "vertical." At the right-hand side, the ball English and vertical control positions are reversed.

There are two unusual controls that add flavor to Odyssey 400. The horizontal control enables each player to move a paddle (or paddles) left and right as well as up and down. In the hockey game, only the forwards move horizontally.

Ball English affects the movement of the ball across the face of the screen. Turning the control quickly in either direction makes the ball go upward or downward, but this control function is activated only for the player who struck the ball last. If the ball movement is from the right of the screen to



ODYSSEY 400

the left of the screen, for example, only the right-hand control can change ball direction. In the smash or hockey games, however, the last player to hit the ball or puck maintains control of the ball English function no matter which direction the ball is traveling.

The stick or paddle size is 1/2 the size of the hockey opening, and the size is fixed. A serve is made from the end of a court, rather than from the center as in most games. When someone wins, the ball continues to be served, but the scoring ceases.

The bottom of the game can be removed to reveal the battery compartment by turning a large center screw about one-half turn counterclockwise. Odyssey 400 requires six "C" cells unless an AC adapter is used. The selector switch for channel 3 or 4 is located at the bottom too.

Whereas most TV game patterns are displayed a little off center, the owner of an Odyssey 400 can customize the image for a perfect display. This includes adjustments for the correct wall position, goal position, and left and right fixed players' horizontal positions. There is even a sound on/off switch for those people who do not wish to hear the bongs and pings that many players find exciting.

Speed is adjustable from very slow (almost four seconds to cross the screen on a serve) to very fast (1/2 second to cross the screen) — a feature that is most welcome when both small children and adults will be using the game.

CONCLUSION: Although there are many people who probably enjoy the challenge of altering the ball's direction as it moves across the screen, Odyssey 400 can be an awkward, disconcerting TV electronic game. Players have no real sense of direction when using the ball control, and being able to make the ball jump all around is really a gimmick that destroys any sense of what could really happen on a playing field.

The hockey game provides further evidence that Odyssey 400 is unrealistic; a player can drive the puck right through the wall to score a point — not the goal opening, but the wall on which the goal opening is located.

There can be no doubt that the entire Odyssey 400 package is a classy one, from its deluxe case to its linen-type instruction manual. But for realistic sports enjoyment, this game leaves much to be desired.

Ricochet

Microelectronic Systems Corporation
One Electronics Court
Madison Heights, Michigan 48071

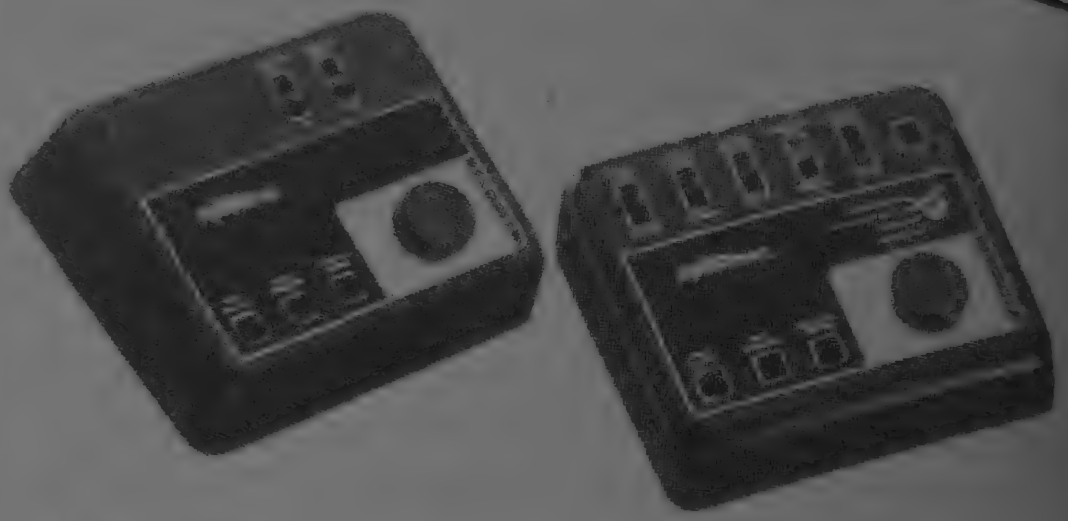
MICROELECTRONIC SYSTEMS Corporation is obviously an imaginative video game manufacturer. Through some clever switching and a few additions to a General Instrument IC chip, the company has created a game — Ricochet — that offers a great deal of exciting competition.

The game consists of two remote controls; there is no main unit. Each control is housed in a case measuring 8 inches wide by 7 inches deep by 3-1/2 inches high, with

the face of each case slanted for player convenience. One of the remotes acts as the master control center. It has five tilt (rocker) switches along the top end of its face. The first is a two-speed ball switch; the second gives a choice of two angles ("English"); the third provides a choice of two racquet sizes; the fourth provides two choices of background color; and the fifth is a reset pushbutton.

The master control center also contains the selector knob for choosing one of the following games: Ricochet (or one-man handball), hockey, tennis, or racquet ball (squash). The other remote has only two switches at the top: power on/off and sound on/off.

Along the bottom-left of each remote are three square pushbuttons. These are the options for surprising opponents. For example, if the Speed Pro/Normal switch is in the Normal position — which means slow speed — each player has the option of switching to the very fast speed at any time by depressing the pushbutton at the bottom called the "Pro Slam Button." Similarly, if the English Pro/Normal switch on the master control center is in the Normal position, the second button on each remote can change the rebound angle from 20-degrees to 40-degrees. By pressing the "Pro English Button," the player changes the paddle from a four-section one to an



RICOCHET

eight-section one so that hitting on the top quarter or bottom quarter of the paddle provides the greater deflection angle.

The third pushbutton is for manual serve, which prevents an opponent from being able to time the serve. At the right of these pushbuttons are the paddle controls, which consist of knobs 1-1/2 inches in diameter.

The top and bottom boundaries consist of dotted lines, while the net, handball walls, and the hockey goalie areas to the sides of the goal area itself are solid lines. In hockey, the stick is 1/3rd the size of the goal opening in the Normal position, 1/6th the size in the Pro position. Each forward is located in the opponent's section of the field.

A sound speaker is located in one remote unit. A low sound is emitted when a point is scored. The sound can be switched off if desired. After one player scores 15

points and wins the game, the ball continues to be served (if the unit is set in the automatic position), but it will go right through any racquet or stick.

The set/game switch is nicely made, and it has an adhesive backing (exposed when protective paper is peeled off) for easy affixing to the back of a TV receiver. Access to the batteries is easy, as it is to the Channel 3/4 switch at the bottom of the master control center. The remotes are separated by 5-1/2 feet of permanently attached cable; the connector cable to the TV set is about 12 feet long.

CONCLUSION: For people who thrive on competition, Ricochet's player controls add the spice that's needed to avoid eventual boredom. This game can provide a great deal of long-term enjoyment since it possesses all the basic features plus the selective ball speed and greater angle deflection options whenever you think you can catch your opponent off guard.

Super Pong

Atari, Inc.
1195 Borregas Drive
Sunnyvale, California 94086

ATARI PRODUCED one of the first consumer TV games after Magnavox brought out Odyssey. An innovator in the coin-operated game business, Atari has refined its original Pong game while maintaining the same exterior appearance. Super Pong is most attractive, indeed, with a pedestal base supporting its slanted control face.

Whereas the original Pong game offered only one game for two players, Super Pong features four games: tennis (singles), tennis (doubles), practice, and catch. Actually, it offers five games since the practice game can also function as a basketball game; the simulated wall can be shortened to permit any size opening at its top. Missing is the ever-present hockey game, but catch is a welcome substitute.

The catch game has goal openings on opposite vertical walls much as hockey does, but there the similarity ends. In catch, players move the openings up and down to catch the ball that bounces off boundaries. When a ball is caught — that is, goes through one of the openings — the

SUPER PONG

PONG

player who captured it wins the point and the score is displayed on the TV screen. When a game is won at 15 points, small colored squares move across the screen and a beeping sound occurs. The score remains posted.

Unlike most TV games, Super Pong displays full color on a color TV receiver. Color quality is quite good, as is the black-and-white picture when Super Pong is connected to a non-color set. In the color display, the ball is green when on one side of the court and blue-violet when it goes over to the other side. The paddle and score appear in green on one side, blue on the other side. The center area on both sides has a pinkish cast.

Only one paddle size is available, but the ball speed automatically increases after about four volleys from approximately 1-1/4 seconds per full court travel to about 1/2 second, making the Super Pong match more challenging.

Three differently pitched sounds emanate from the built-in speaker positioned in the middle of the game's front panel. A high-pitched sound occurs when the ball is served, a medium-pitch sound when a paddle makes contact with a ball, and the lowest-pitched sound when a ball goes out of the court at either end. A slide switch with numbers 1 through 4 at the base of the pedestal handles game selection, but there

are no specific game designations. There also is no manual-serve function in Super Pong.

Large brown and black knobs with silver inserts control paddle movement. The knobs are reasonably large and comfortable for players to handle. The overall size of the console is 10-1/2 inches wide by 5-1/4 inches deep by 5-1/4 inches high. The entire bottom opens for battery replacement, and four "D" cells are required. Also located at the bottom is a channel-change slide switch for switching to channel 3 or 4, depending upon which channel is not used for regular TV broadcasts.

CONCLUSION: Super Pong is a good all-round TV game, with the catch game being especially interesting. It is definitely a well-designed, well-constructed, and attractive unit. The controls could be farther apart, however, and the addition of a manual-serve function would make Super Pong even more exciting. People who own black-and-white TV sets can probably get more value for their dollar, and all buyers should be sure to avoid Atari's regular Pong game — it becomes very boring very quickly.

Super Pong IV Tele-Game

Sears, Roebuck and Company
Sears Tower
Chicago, Illinois 60684

A FOUR-PLAYER game made for Sears by Atari, Super Pong IV Tele-Game is essentially the same as Atari's two-player Super Pong and it is identical to Atari's four-player unit. There are two hand-held remote controls which can be plugged in to enable two additional players to join the game. If you have a large family or are entertaining a group of people, therefore, you can have a great deal of fun with Super Pong IV Tele-Game.

With the doubles tennis game, for example, you can have eight paddles on the screen for an especially challenging (and confusing) video contest. You can play singles catch by adjusting one side of the screen until the goal disappears, or you can play doubles catch by having the openings appear at each of the wall ends. The unit also has a ball speed switch to increase the action and the challenge.

Although set to play on channel 3, Super

SUPER PONG IV TELE-GAME

Pong IV Tele-Game has a channel altering switch at its bottom in the event that channel 4 is the unused one in your area. If that is the case, you merely remove the bottom

SUPER PONG IV TELE-GAME

with a Phillips screwdriver and simply push the slide switch (located under the battery compartment) to the side marked "CH 4".

CONCLUSION: Only those people who have large families or who entertain large crowds frequently will derive sufficient use from this game's four-player facility to justify its price.

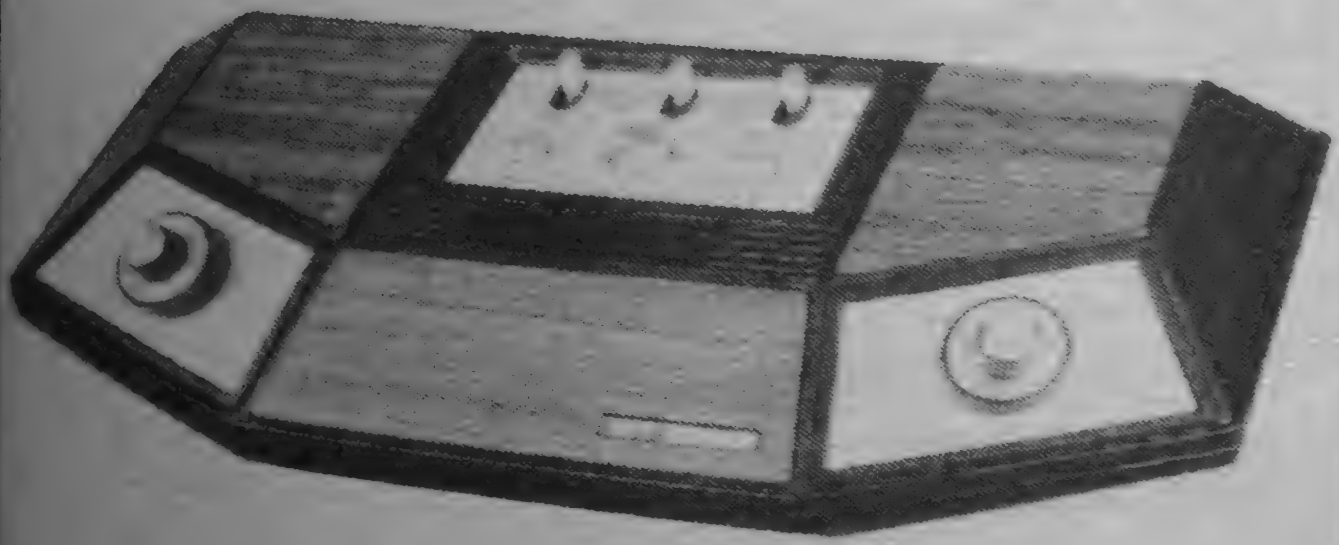
TV Fun Model 401

APF Electronics Inc.
444 Madison Avenue
New York, New York 10022

LIKE OTHER GAMES that utilize General Instrument IC's, APF Electronics' TV Fun Model 401 performs the standard repertoire of game operations with a black-and-white display on color and monochrome TV sets. What sets it apart from the rest, however, is its handsomely styled console. Walnut graining, silver and black colors, and attractively angled player sections give the APF TV Fun 401 an aura that other games lack. It

even has a pilot light to indicate when the power is turned on.

With TV Fun you get the standard tennis, hockey, squash, and practice games. Action is enhanced by three differently pitched sounds for hit, score, and boundary deflection. Across the top of the console are three, high cylindrical toggle switches, each offering a choice of professional or amateur positions for rebound angle, paddle size, and ball speed. Below are two good-sized game start and power on/off pushbuttons and a rotary switch for selecting one of the four games. Game designations are marked simply, 1, 2, 3, and 4. Slanted at an angle are the control knobs which, though a bit too small for adults to use comfortably, do a fine job.



TV FUN MODEL 401

The TV Fun 401 console measures about 17 inches wide by 8 inches deep by 3-1/2 inches high. A span of ten inches from the center of one small control knob to the other separates the players.

The amateur hockey stick covers about 1/3 of the goal opening. Switching to professional reduces the size of the stick and makes the game more challenging. The same is true for ball speed; amateur speed is about 1-1/2 seconds, while professional speed is about 3/4 second per full court travel.

TV Fun 401 runs on the familiar six "C" batteries and it has a switch for conversion to channel 3 or channel 4. The game/set switch is well-made, with a cord that extends some 16 feet from where one end connects to the TV antenna to where the other end plugs into the game console.

CONCLUSION: Those video game purchasers who prize console appearance over operational features and options will find exactly what they want in APF's TV Fun Model 401.

TELSTAR 6040

Coleco
945 Asylum Avenue
Hartford, Connecticut 06105

TELSTAR 6040 was one of the early video games, appearing on the market shortly after the original Odyssey games were introduced. Its larger-than-usual console size — 18-1/2 by 8 by 5-1/2 inches — and its large control knobs provide a greater degree of player comfort than most other models currently available. Of course, it requires more storage space as well. Video appears in black and white only on either a color or black-and-white TV set.

Telstar features two different two-player

TELSTAR 6040

games — tennis and hockey — and a one-paddle, one-player practice game. Switches are located in a well area at the center-bottom of the angled face. At the top of the well is a single three-position slide switch for game selection. In the middle are the power on/off and reset pushbuttons, and at the bottom is another single three-position slide switch for beginner, regular, or pro adjustment.

The beginner position offers a large-size paddle and slow speed (about two seconds for the ball to move from one end of the court to the other); regular (or intermediate) produces a medium-size paddle, half the size of the beginner's, with the slow ball speed; the pro position returns the paddle to the beginner's (large) size, but it doubles the ball speed. Ball serve is automatic; there is no manual-serve function. Like other games utilizing IC's from General Instrument, Telstar 6040 emits three differently pitched sounds.

The FCC-approved game/set switch is a good sturdy one, but the console was obviously designed to keep production costs at a minimum. Thin wood-grained paper is pasted rather sloppily over the face — no one would ever mistake the covering for real wood. The slide switches, although functional, do not present a quality appearance. In addition, the garish color scheme — cream and brown, black and green, and

a large red logo — makes this unit one that few people will want to leave on display in a living room or family room.

CONCLUSION: Although not a bad game overall, selling at a fair price, the Telstar 6040 lacks so many of the good features presently available — handball game, manual-serve function, aesthetically pleasing design, etc. — that purchasers who can afford something better would be wise to pass this one by.

TV Game Machine Model TG-66

KingsPoint Corporation
106 Harbor Drive
Jersey City, New Jersey 07305

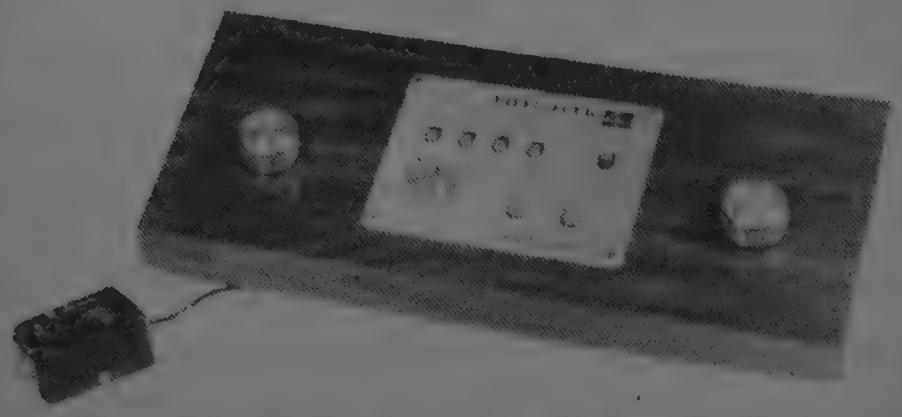
A RATHER LARGE (14-1/4 inches wide by 6-1/4 inches deep by 2-1/2 inches high) game packaged in an attractive walnut-grained cabinet, Model TG-66 from KingsPoint Corporation displays its game image in black and white on either a color or monochrome TV receiver. Four toggle switches along the top of the console provide a choice of rebound angle, fast or slow ball speed, short or long

paddle size, and manual or automatic serve. To the right of these switches is the power on/off toggle switch.

At the bottom of the console are the game selector knobs, the reset pushbutton, and the manual-serve pushbutton. The paddle controls are large metal knobs in the sections to the right and left of the console. Operation is nearly identical to Apollo 2001 from Enterprex in that 15 points wins, rebound angle is adjustable, and so on.

Six "C" cells or an optional AC adapter can be used to power the game.

CONCLUSION: This sturdy, attractive unit might be worth its somewhat higher price to buyers who are decor-conscious. Insofar as its operating features and competitive potential are concerned, however, the KingsPoint TV Game Machine Model TG-66 offers no more than most other models currently on the market.



TV GAME MACHINE MODEL TG-66

TV Sports 802

Lloyd's Electronics, Inc.
180 Raritan Center Parkway
Edison, New Jersey 08817

TV SPORTS 802 from Lloyd's Electronics, Inc., offers six home video "sports": tennis, hockey, handball, practice, skeet shooting, and target shooting. Housed in an attractive console that measures 11 inches wide by 8 inches deep by 3 inches high, the 802 features lever-type remote controls with cords that extend nearly five feet long. The cable that attaches to the game/set switch is almost 15 feet long.

The slanted top portion of the console boasts large square pushbutton switches for game selection. Each pushbutton has drawings (racquet, stick, playing field, etc.) above it to signify which game is being chosen. At the extreme right-hand side of the console's top portion is a large red on/off power switch.

At the bottom portion of the console are four toggle switches. The first one is the channel 3/channel 4 switch, followed by paddle size adjustment, ball speed and angle selector, and manual or automatic serve function. A large pushbutton handles activation of the manual serve. At the extreme right is an even larger pushbutton for resetting the score. The unit runs on six "C"

cells or an AC adapter, none of which is supplied.

Fifteen points wins, as is the case with most other video games. What is uncommon about TV Sports 802 are the target-shooting games. Target game #1 is a simulated skeet-shooting contest, either with automatic or manual "clay" targets moving diagonally across the face of the TV screen in imitation of birds on the wing. Target game #2 presents a random-moving target at which the player shoots with a separate pistol (adding a shoulder stock and a long barrel converts it into a rifle). The pistol has a built-in photoelectrical cell, and it plugs into the console via a cord more than six feet long.

TV SPORTS 802

MONTEVERDI
TV SPORTS 825

CONCLUSION: The standard games are fine, especially since the paddle size, ball speed, and serve are all adjustable. But, what really makes the Lloyd's TV Sports 802 exceptional are the target-shooting games. Skeet shooting and random-target shooting are exciting, and the excitement is enhanced by the digital display of each hit. The entire package, attractive in appearance and versatile in operation, is reasonably priced. The same unit with a slightly different exterior is sold by Monteverdi — the consumer division of Lloyd's Electronics, Inc.. — as TV Sports 825. Both units retail at the same price.

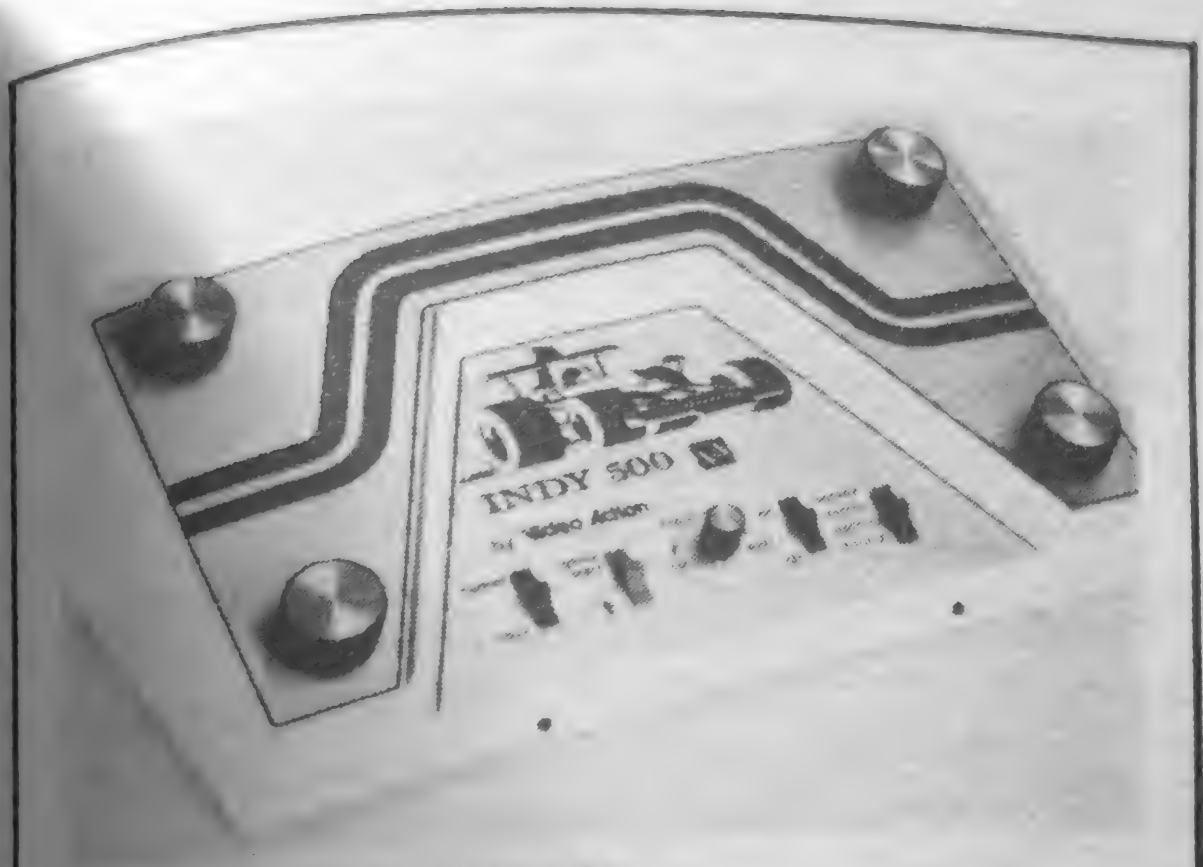
Video Action Indy 500

Universal Research Labs, Inc.
2501 United Lane
Elk Grove Village, Illinois 60007

ALTHOUGH IT OFFERS tennis and hockey for one, two, or four players and a practice game, the Video Action Indy 500's real claim to fame is, as its name implies, an auto road race game. Indy is a full-color game that can be played by one (against the machine) or more participants.

In the racing game, a continuous onslaught of simulated cars comes screaming down from the top of the screen. At the bottom of the screen is the player-controlled car. The purpose of the game is to avoid collision with any of the oncoming cars (which gradually pick up speed) by moving the control car left or right. Should a collision occur — and no one can avoid all the other cars for long — there is a flash, a collision indicator beeps in rapid-fire style, and the cars all stop while a point is registered against the driver. Then the race automatically starts once again until nine points are registered; at that point the race is over.

Playable by one or two people, the Indy



VIDEO ACTION INDY 500

500 race game is definitely challenging. For competitive purposes, players can count the number of cars that pass without a collision or keep track of the time a player drives without an accident occuring.

Nine points ends the contest whether the game is racing or tennis or hockey. When a game is over, a standby pattern appears on the screen. During the game, a dash-line divider appears down the middle of the TV screen, serving as a net for tennis, two tracks for the racing game, etc.

The game console is arranged with a player control knob in each corner, although the only instances in which all four knobs are used occur in two-player tennis and hockey.

The game switches — one for "Human" or "Robot," another for game start — are set into a plastic well. In the center is a knob marked "Robot Skill," while the slide switches are for power on/off and game choice.

The Robot switch position sets up a most interesting man-against-machine game. Here a player(s) competes against the machine, which controls paddle movement on its own. The Robot Skill control can be adjusted to match the skills of either a novice or an experienced player. In the latter instance, the machine-controlled paddles are extremely adept, making it especially difficult to get a point past them.

The paddles are segmented for different ball-return angles. If the ball strikes a paddle on the upper or lower parts, the angle of the ball's rebound is greater. Ball or puck speed is increased automatically on the second and sixth volleys, providing three distinct speeds. Paddle size cannot be changed, however. The hockey goal net opening is much larger than the length of the goalie paddle, and is, therefore, a more challenging game than most video hockey setups.

Six "D" cell batteries are required to power the Indy 500 unless the AC adapter accessory is used. The lift-out battery compartment at the bottom of the case, revealed by turning a lock screw and lifting out the holder, is an unusual feature and a good one in the

event that batteries leak at some time. An external battery holder makes it much easier to clean the terminals.

CONCLUSION: Video Action Indy 500 retails at a rather high price, but the game does offer a great deal of variety to prevent the onset of boredom. The unit is put together nicely, and it does provide some interesting twists. Someone willing to spend this much money on a standard video game, though, might be better off spending a little more for a microprocessor unit with its theoretically endless supply of new games.

Windsor Model EP460

Lafayette Radio Electronics Corporation
111 Jericho Turnpike
Syosset, New York 11791

A LOW-PRICED four-function — tennis, hockey, squash (or handball), and practice — game, the Windsor Model EP460 produces a black-and-white video display. It has a slanted center portion with a speaker grille on top and a large game selection knob centered below it.

On the front panel are five nice toggle switches for paddle size (large or small), serve (manual or automatic), speed (slow or fast), angle (20 degrees or 40 degrees), and power on/off. On either side of the slanted center portion are the slide controls to move the paddles. On the right, is the red reset pushbutton.

Two remote-control units plug into the side of the console; each unit has rotary knob controls. The cables for the remote-control units are about 5-1/2 feet long, while the cable from the game to the TV receiver is more than 12 feet long. The TV/game switch is encased in a small well-constructed enclosure.

The video image is sharp, with the top and bottom boundaries of the playing field composed of dots. In the hockey game, the forwards are in the opponent's half of the field, which makes the contest more challenging, and both forward and goalie sticks move in unison. The large paddle is about 1/3 the size of the goal opening, while the small paddle is half its size. At slow speed it takes almost two seconds for a ball to traverse from one end of the field to the other on a serve; at fast speed, which is fast indeed, it takes only about 1/2 second.

The angles change when the ball (or puck) hits different sections of the stick, from straight ahead when contact is made dead center to progressively sharper angles as the

WINDSOR MODEL EP460

ball approaches the end sections. Play at the 40-degree angle, small paddle, and fast speed, and you have one of the most challenging games to your reflexes around. When someone scores 15 points and wins the game, the ball continues to be served but it goes right through the paddles.

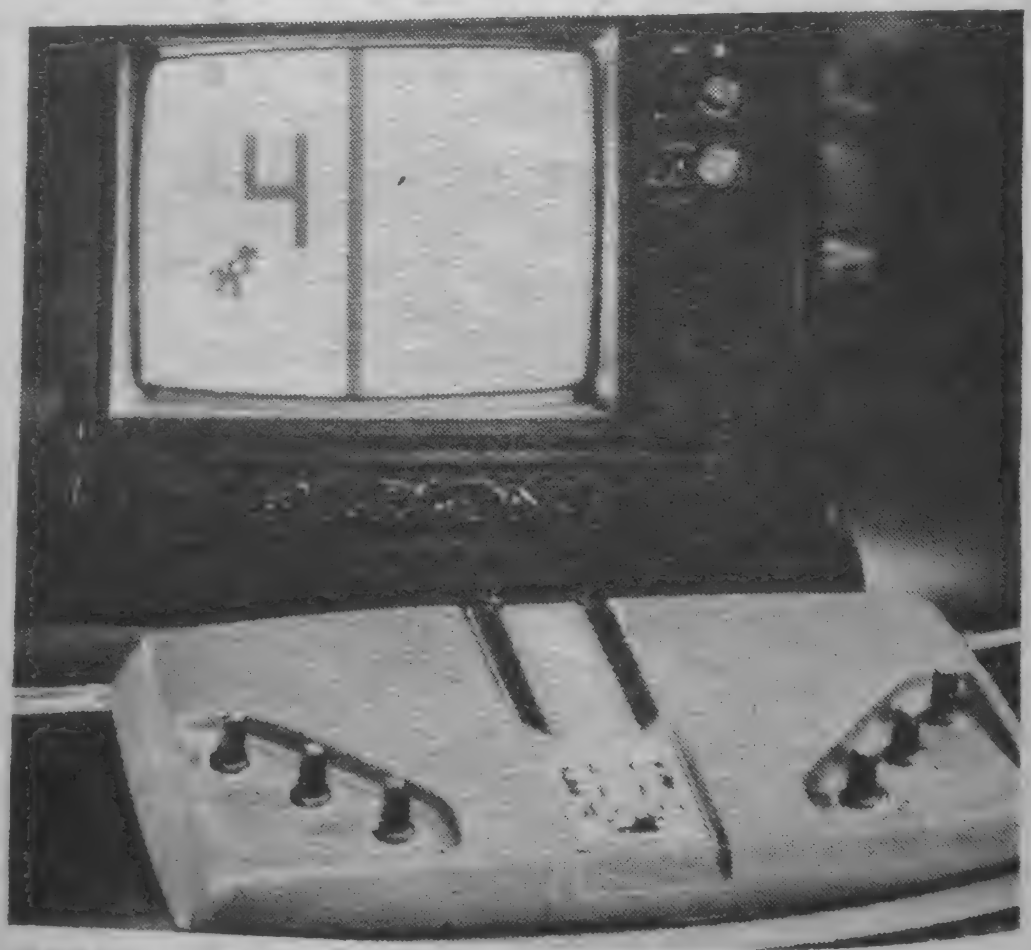
The Windsor EP460 runs on five "C" cells, which must be inserted into a lift-up well at the bottom of the case. A 7-1/2 volt DC adapter at 150 milliamps can do away with battery replacement, but batteries are good for many hours of play. The tan-and-black cabinet, with thin metal plates in the slide-control area, cannot be considered the most attractive unit available, but it is not unattractive either.

CONCLUSION: Considering all its features, and especially its ability to present a great skill challenge when set for small paddle, fast

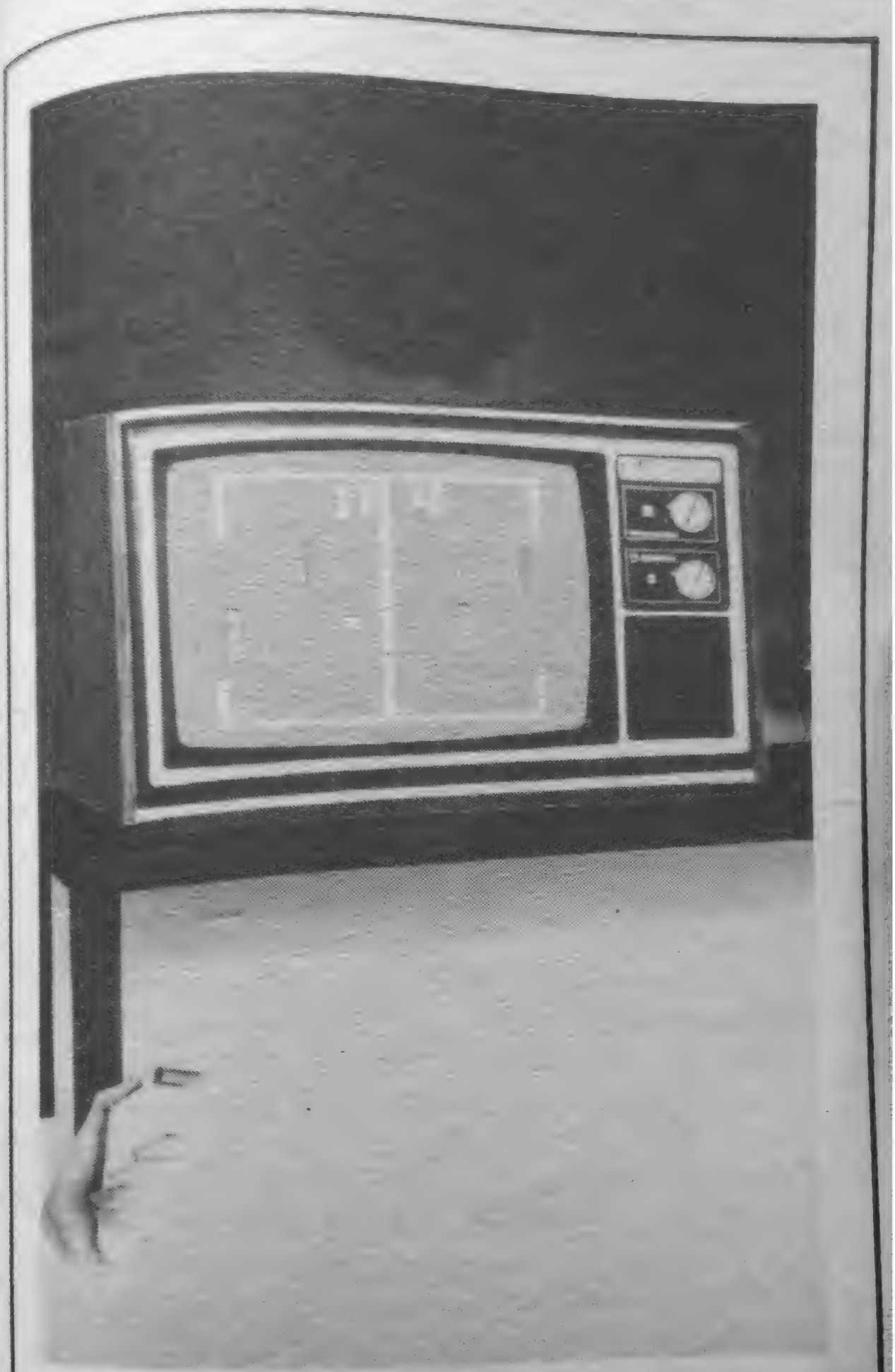
speed, and sharp rebound angle, the Windsor EP460 from Lafayette Radio Electronics qualifies as a first-rate value in today's video game marketplace.

Other Video Games

THERE ARE MANY more video games on the market, most of which are quite similar to the models that appear in the preceding test reports. The Odyssey 500, the first Magnavox game to feature full-color dis-



ODYSSEY 500



ODYSSEY 500

GAMEROOM TELE-PONG

play, depicts athletes on screen with paddles in hand. The game comes with an AC adapter. Magnavox is also marketing a 19-inch color TV console with a built-in video game and remote controls.

Perhaps the least expensive game around is Tele-Pong from Entex Industries. Tele-Pong offers three games — tennis, squash, and automatic (player against machine). The controls move the paddles horizontally as well as vertically, but Tele-Pong does not display the score automatically on the TV screen. Two little manual dials must be moved by players for score-keeping. At its budget price, however, Tele-Pong is a good value and an interesting game.

Unisonic's Tournament 2000 game is

PHONEMATE ZONK

very similar to Allied Leisure's Name of the Game, but with an additional skeet-shooting game. Phonemate, Inc., is promoting its Zonk video game, a six-game unit (including two target games) with a "Super Challenge" control to provide random alteration of ball speed and rebound angle.

Video Game Kits

FOR THOSE PERSONS who are handy with a soldering iron, there are a few kit-type video games available. The problem with most kit games, however, is that legally they cannot be attached to a TV set's antenna terminals without first receiving FCC approval. As a consequence, most

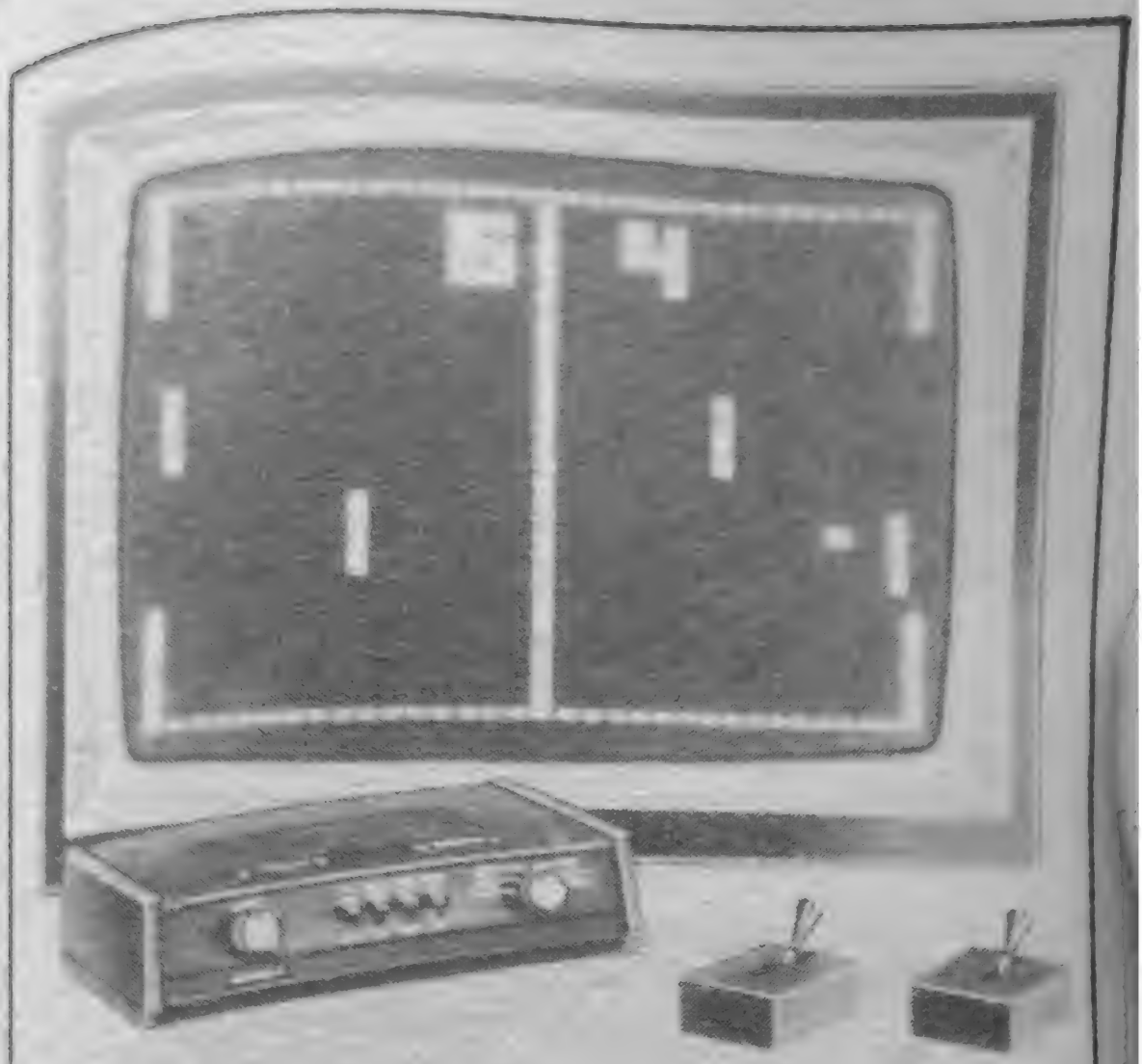
kits are designed for electrical connection to the first video amplifier input stage of a TV receiver; to make such a connection one has to go inside the TV set. There is at least one company, however, that does sell an oscillator kit that allows the connection to be made to the TV set's input terminals. The company, ATV Research (Dakota City, Nebraska 68731), calls its oscillator kit the PXV-2A Pixe-Verter.

Some of the kits utilize discrete components. That means that the builder must assemble many individual integrated circuits and other parts rather than working with a few large-scale IC's.

Among the companies that offer video game kits are the following:

- **Cal Kit, Inc.,** P.O. Box 877, Sebastopol, California 95472. The Cal Kit video game offers some unusual features, including a slam button that allows a player to catch an opponent off guard with a sudden fast ball. It can also be set for a ball that traverses in an arc, continually variable speed, and controlled ball-angle return.

- **The Heath Company,** Benton Harbor, Michigan 49022. The Heath Sportscreen TV game comes with remotes, plays in full color, and is designed to accept an add-on target-shooting game.

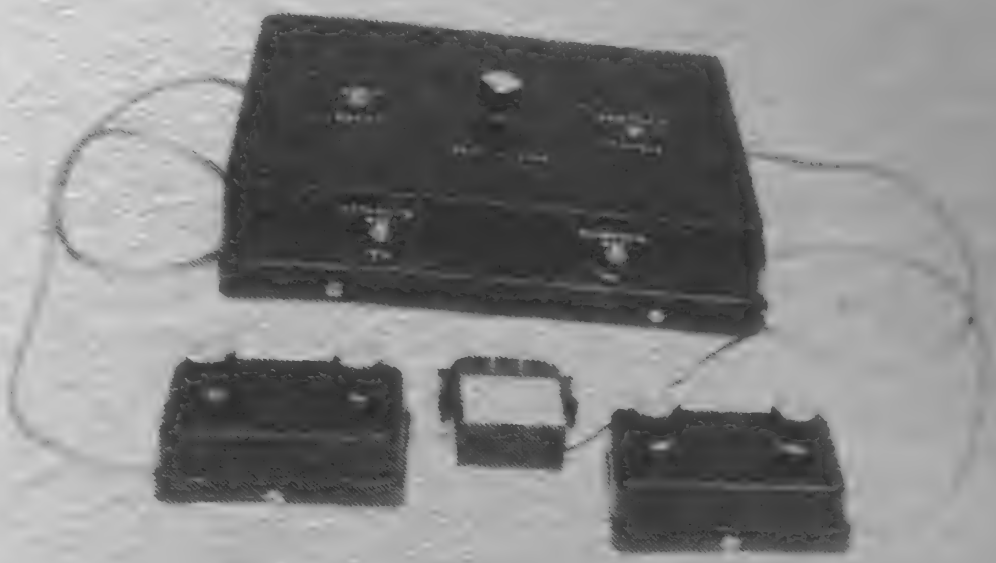


Heath Company's Sportscreen TV game kit comes with remotes, plays in full color, and is designed to accept an add-on target-shooting game. The Sportscreen comes with a very complete and easy-to follow instruction manual.

- **Interfab,** 27963 Cabot Road, Laguna Niguel, California 92677. Interfab markets a double-sided printed-circuit board and an 18-page assembly manual at an attractively low price; the company also offers three full kit games.

This is what the Interfab kit looks like when it comes from the factory.

The Interfab kit assembled.

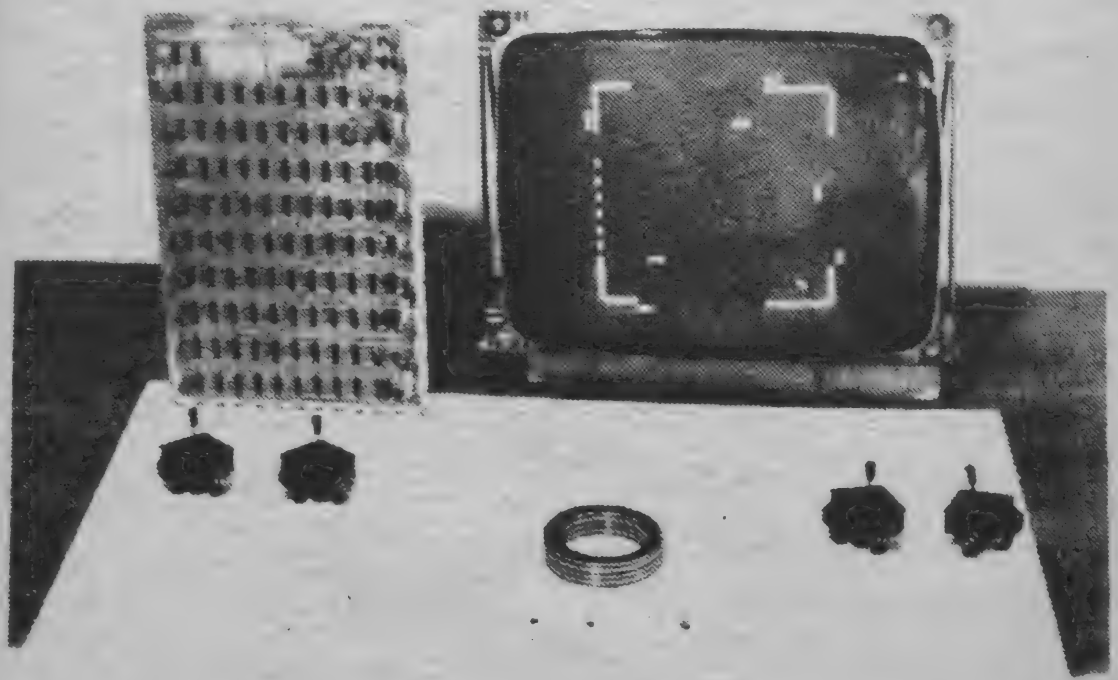


The finished kit from Interfab Corporation is a neat and attractive package that belies its low price.

- **James Electronics,** P.O. Box 822, Belmont, California 94002. A major supplier of electronic parts, James Electronics makes a basic video game kit that includes Kraft joysticks.

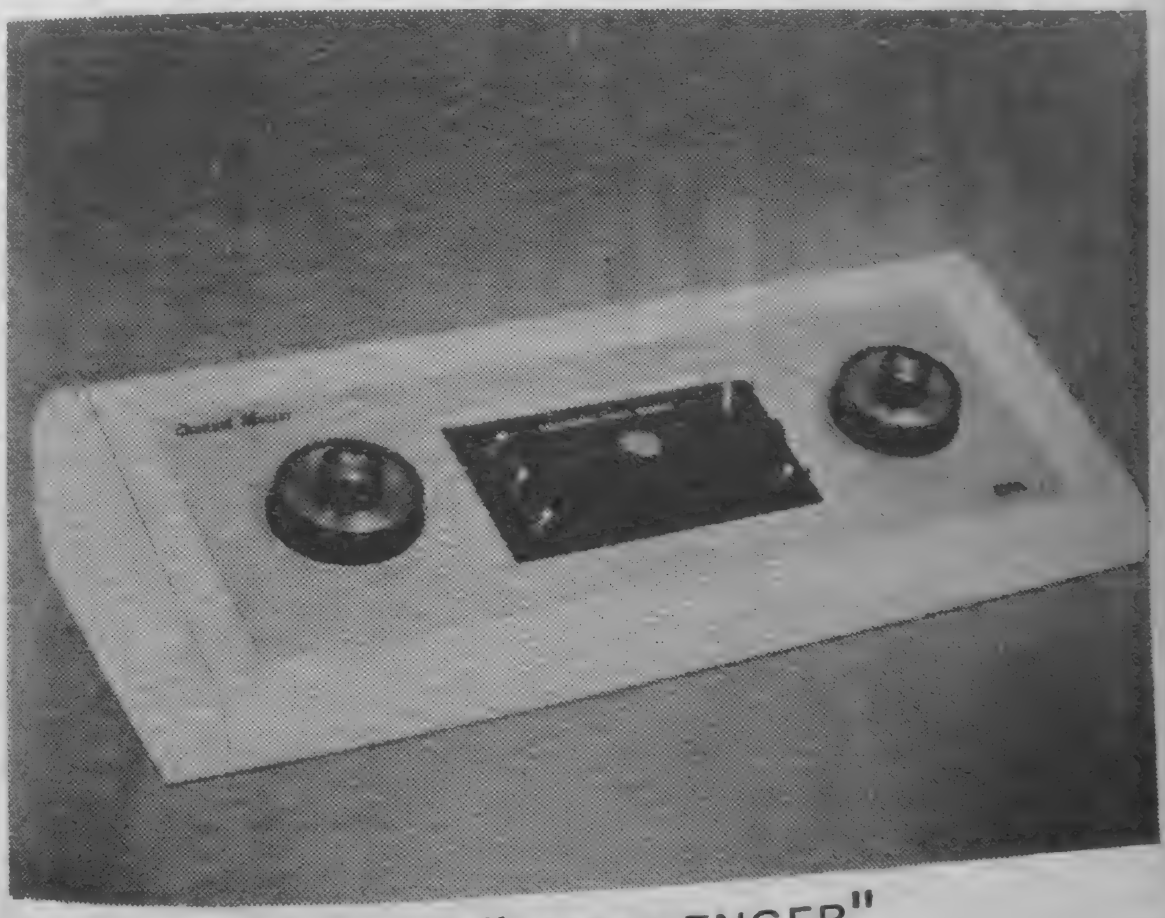
- **Southwest Technical Products Corporation,** 219 West Rhapsody, San Antonio, Texas 78216. Another major kit supplier, SWTC offers a Space War Game in which every player has two remotes, each with a large control knob

for positioning a large square (this is the space ship) vertically on the TV screen and a pushbutton to fire a "laser beam" in an effort to destroy the enemy's space ship. The enemy, naturally, tries to stay out of line with the other's space ship — unless he can fire his laser beam first. The laser beam travels at tremendous speed in a dashed square line. If it hits the ship, the ship disappears. If it misses, however, several seconds must elapse before pressing the button will fire the laser beam again.



JAMES ELECTRONICS VIDEO GAME KIT

CHANNEL MASTER "CHALLENGER"

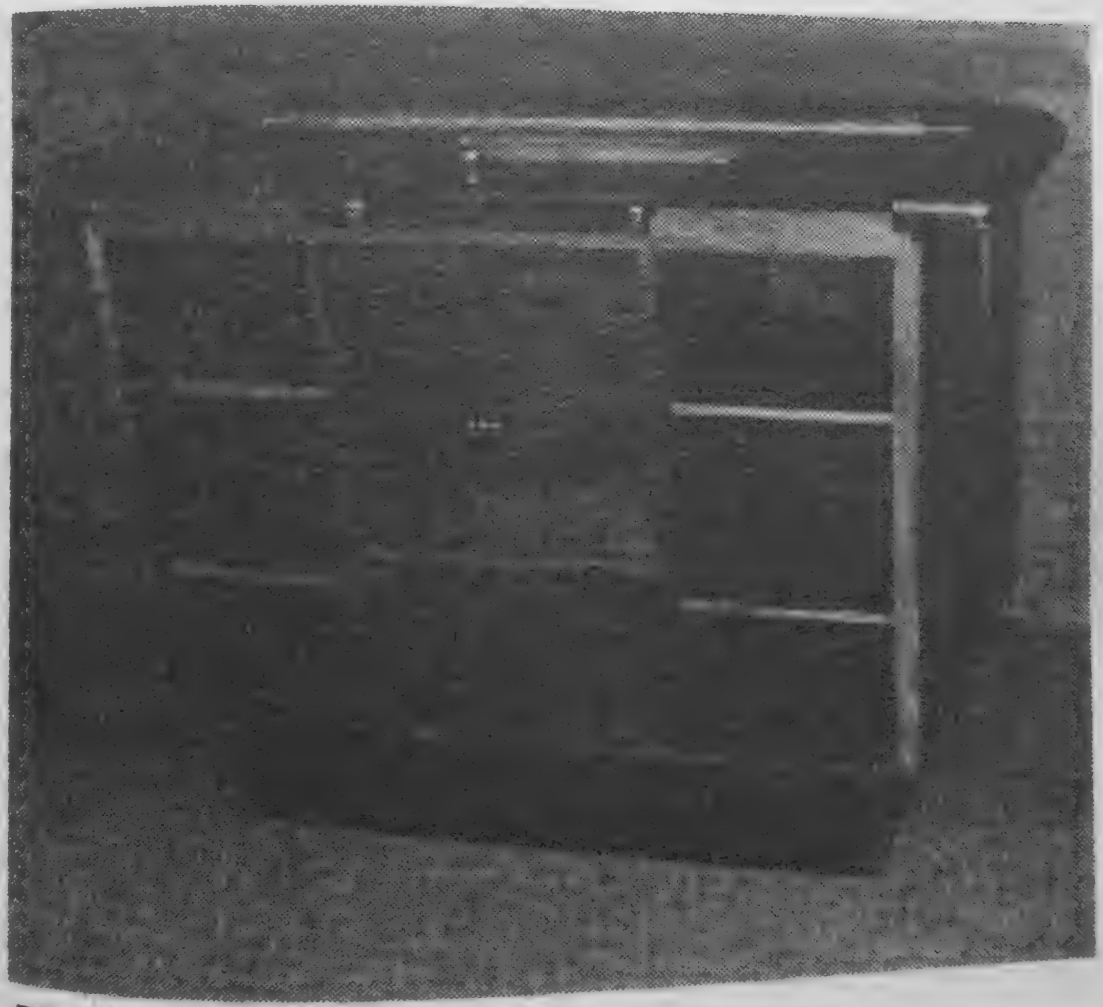


CHANNEL MASTER "CHALLENGER"

PROAM ELECTRONIC TENNIS

PROAM ELECTRONIC TENNIS MODEL TR2P

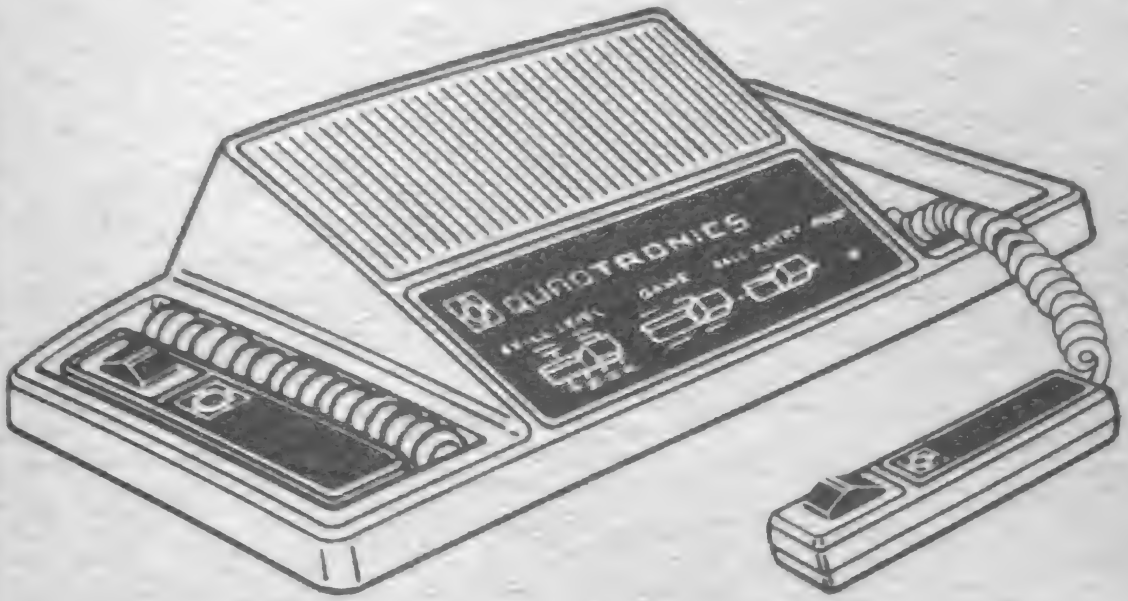
PROAM MODEL B3P



PROAM MODEL B3P

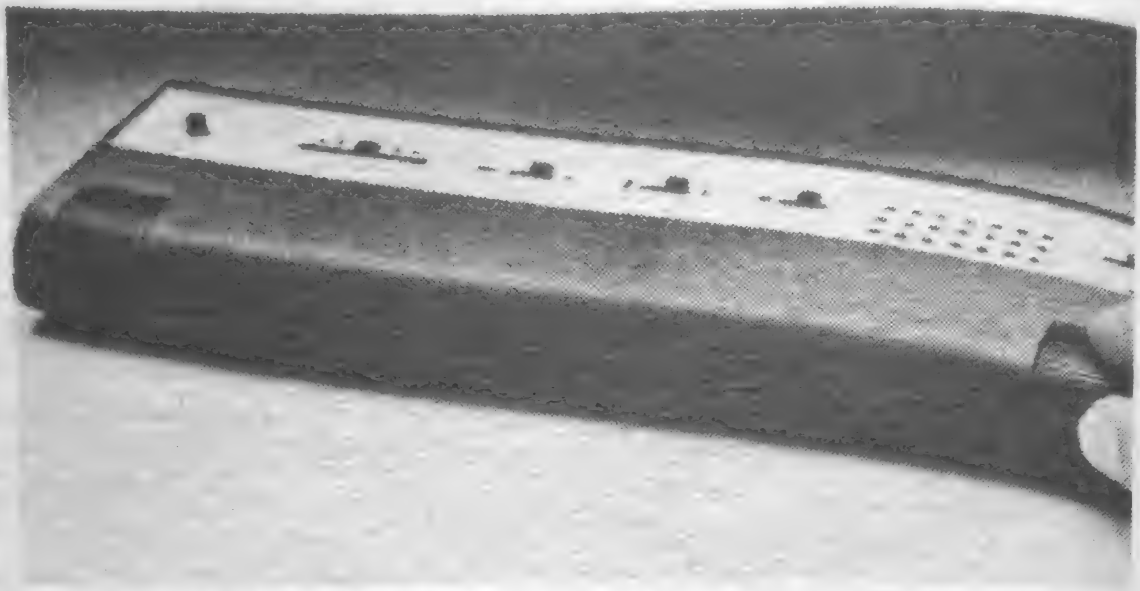
FAIRCHILD VIDEO ENTERTAINMENT
SYSTEM WITH CARTRIDGE

HANIMEX TV GAME

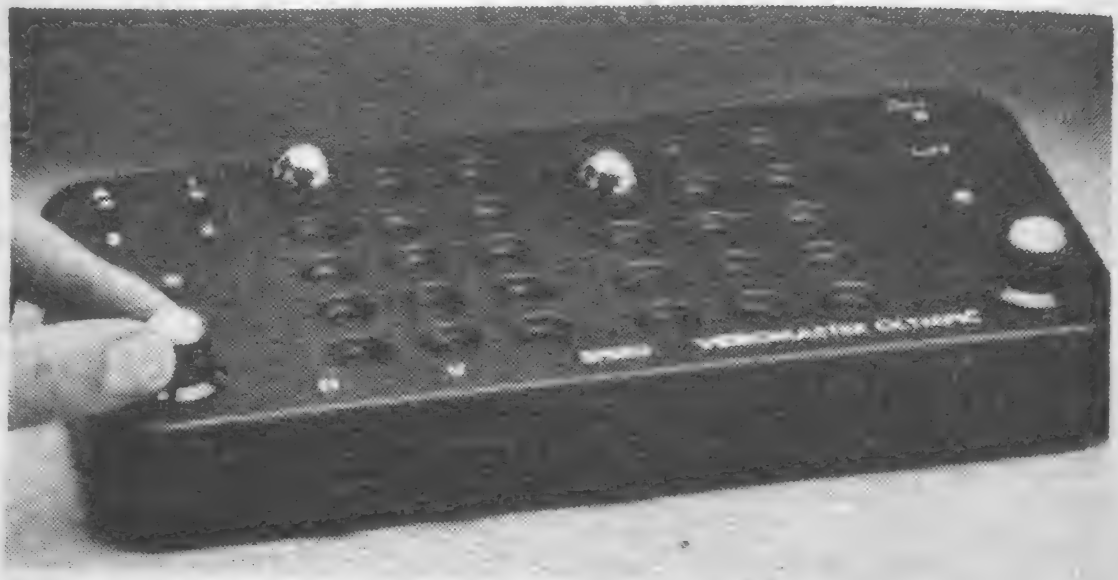


QUADTRONICS MODEL Q 476

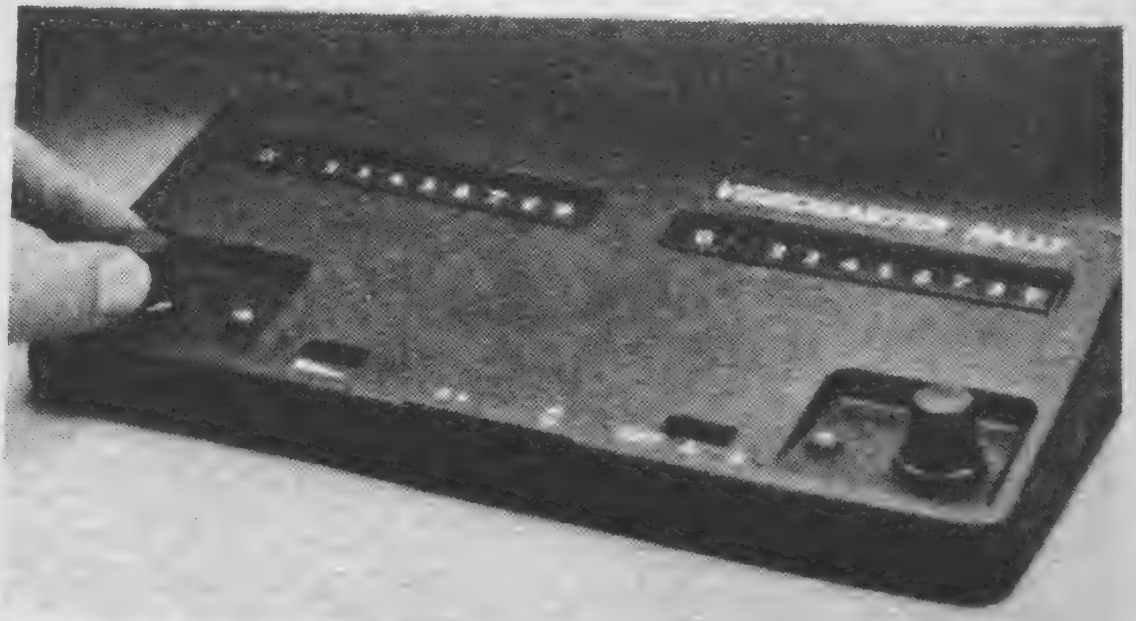
SANTRON TG-201, 101



VIDEO MASTER SUPERSCORE

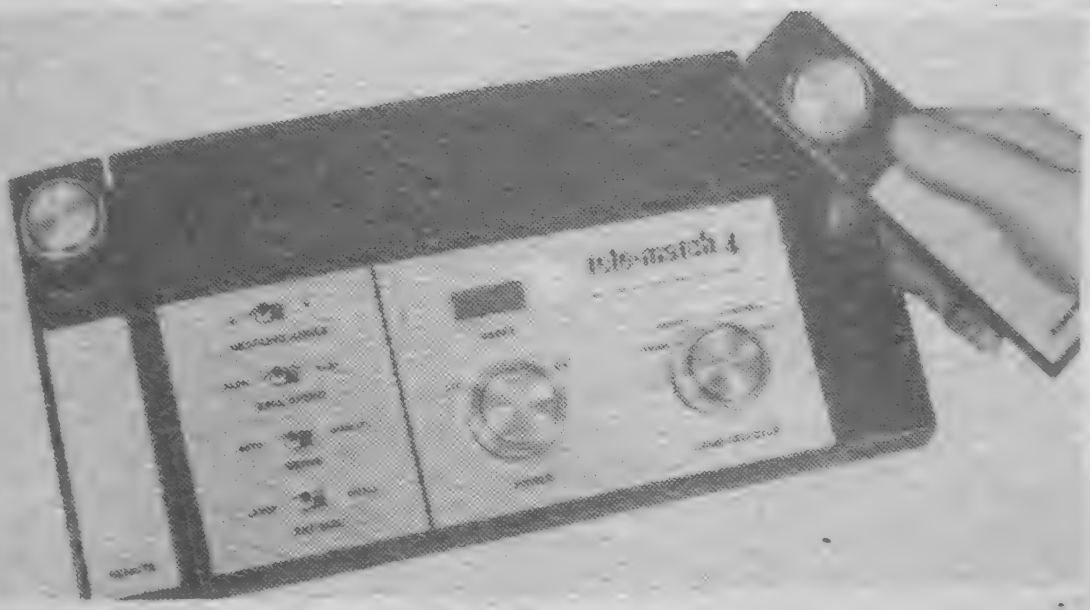


VIDEO MASTER OLYMPIC

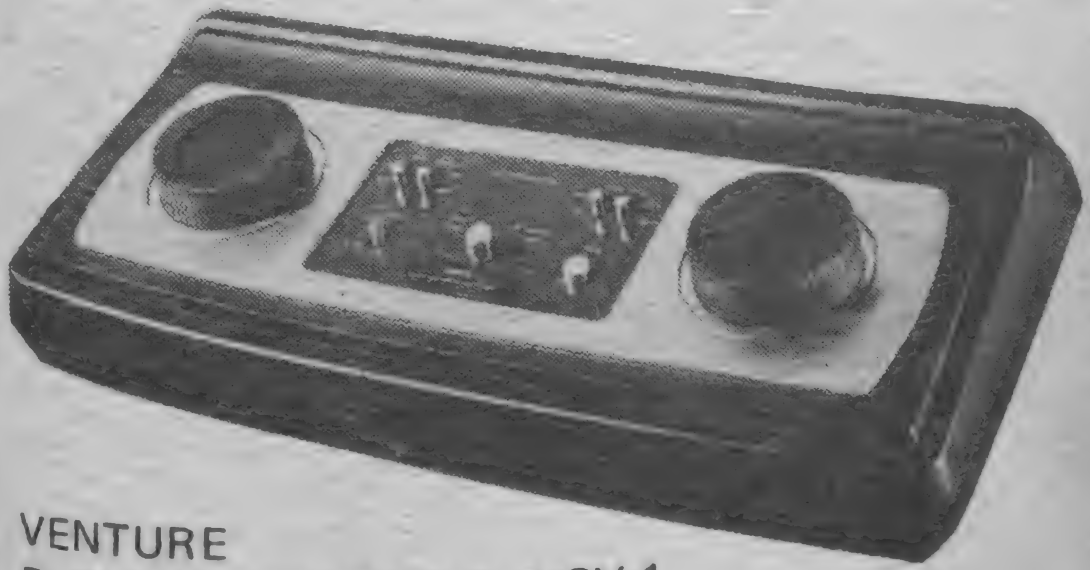


VIDEO MASTER RALLY

TELE-MATCH 4 MODEL 7700



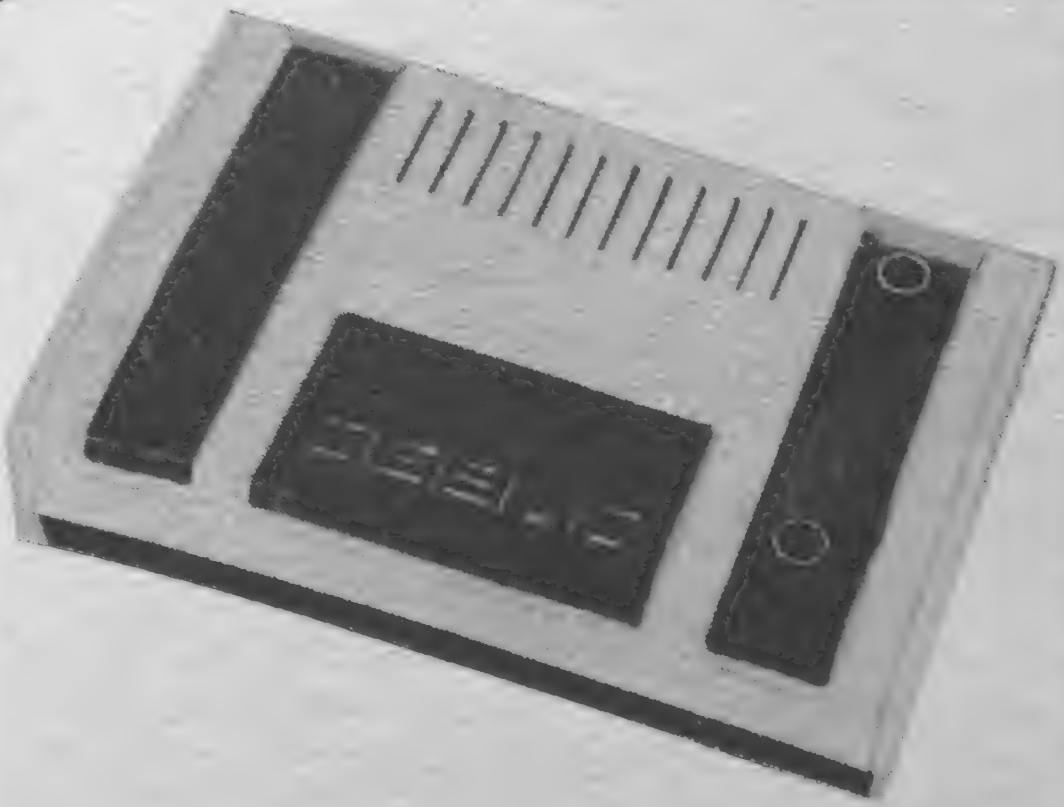
TELE-MATCH MODEL 4400



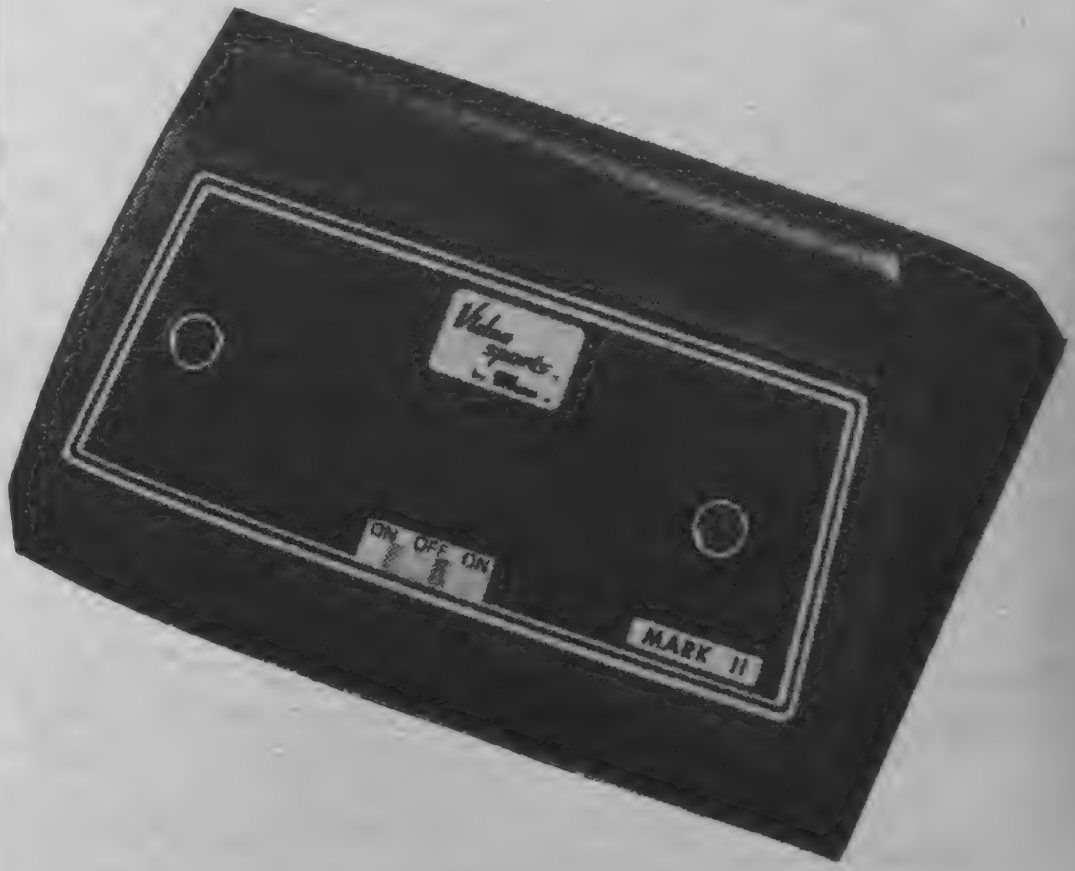
VENTURE
ELECTRONICS MODEL VSV-1

CONCEPT 2000 MODEL 1004

CONCEPT 2000 MODEL 1004



VIDEO SPORTS 4+6, FIRST DIMENSION



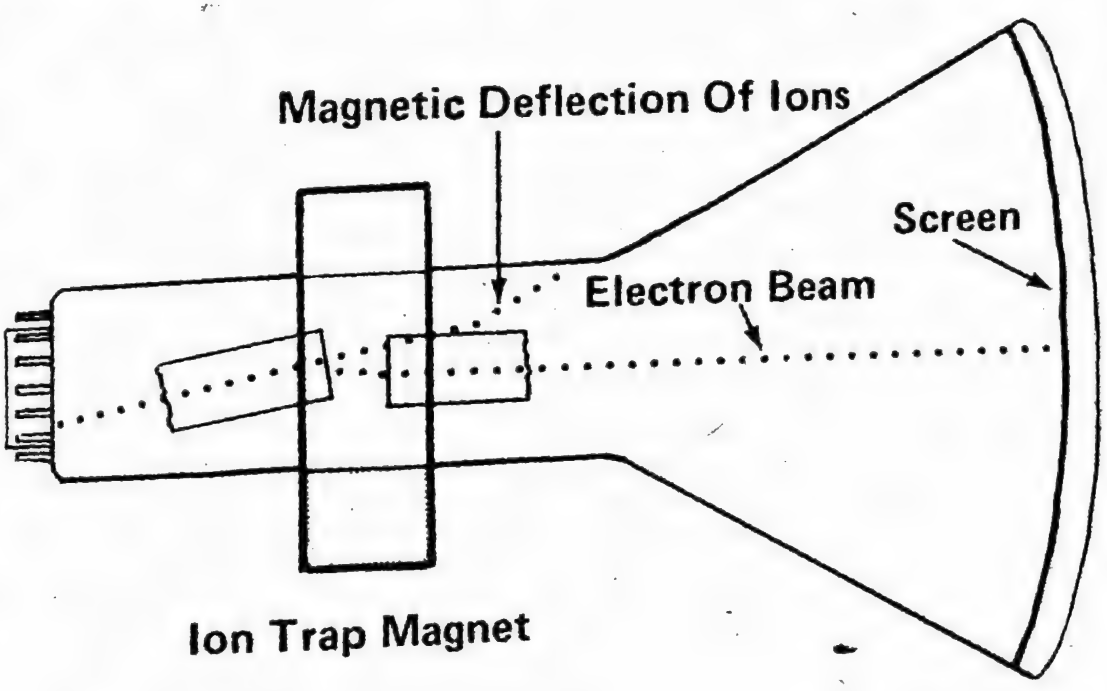
VIDEO SPORTS MARK II, FIRST DIMENSION

Can Video Games Harm Your TV?

THE FEDERAL Trade Commission has received inquiries concerning the possibility of video games damaging TV picture tubes. Consequently, the agency is currently conducting an investigation to determine what hazard, if any, video games pose. At this point, no evidence of such damage has surfaced even after video games have been played for inordinate lengths of time. Naturally, there always exists a possibility of damage to the TV set's picture tube under situations of abuse, but aside from such situations there is no reason to think that consumers have anything to worry about when they buy an FCC-approved video game.

In the early days of television, though, this kind of concern would have been a dif-

ferent matter. Decades ago, ion traps (magnets) were positioned around the neck of a TV picture tube over the cathode section. Since magnetic deflection of ions was quite inefficient to begin with, a misadjusted ion trap could permit a heavy concentration of ions to escape and strike the screen. Over a period of time, this bombardment of ions (which are about 2000 times heavier than electrons) striking the center of the TV screen could eventually remove some of the screen's phosphor coating and cause a brown spot to form. This area would thus be rendered insensitive and would either produce a less bright



Some early TV picture tubes suffered brown spots caused by magnetic deflection of ions onto the center of the screen. There is no evidence, however, that video games damage modern picture tubes.

picture image or no picture image whatsoever.

As TV sets have been improved through the years, however, a variety of better methods have been developed to prevent a concentration of ions from reaching the TV picture tube's phosphor screen. Whereas the early tubes used a bent gun with an ion trap to deflect ions, present-day picture tubes generally employ a very thin layer of aluminum over the phosphor. The slow-moving ions cannot penetrate the aluminum and, therefore, cannot reach the phosphor to do any harm. A byproduct of the aluminized screen is a more brilliant picture offering better contrast. Aluminized picture tubes reflect back to the phosphor, which is a fluorescent material, any light that previously radiated back inside the tube.

The addition of the aluminum screen does not eliminate every possibility of a video game allowing ions to chip away at the phosphor. A person who leaves a video game — especially one that has a playing field made up of heavy, bright borders — on day after day, night after night, may well do damage to his or her TV picture tube. But excluding such excessive users, no one should encounter any set damage from playing an approved electronic video game.

FTC INITIATES INVESTIGATION CONCERNING ELECTRONIC GAMES

The Federal Trade Commission today announced that it is conducting an investigation to determine whether electronic video games adversely affect television tubes. The Commission emphasized that its inquiry is for the purpose of determining whether such adverse effects in fact occur and that it has reached no conclusions on this matter.

Pursuant to Commission policy, the investigation will not be public. The existence of an investigation does not imply that violations of law have occurred.

For Immediate Release Wednesday, December 22, 1976
Federal Trade Commission Bulletin

Other Electronic TV Attachments And Accessories

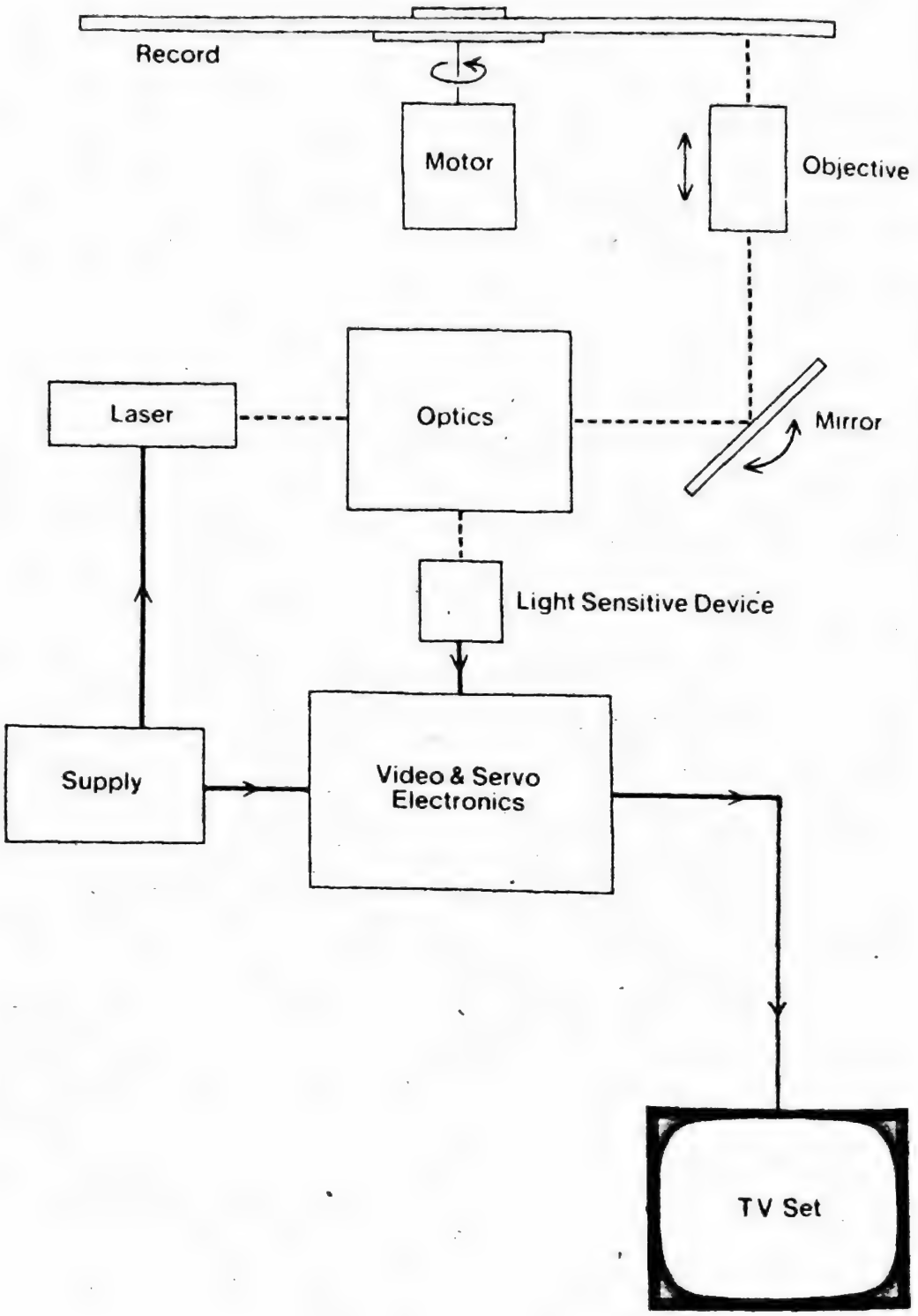
ELECTRONIC VIDEO games are the most popular TV set add-ons at present, but they are by no means the only ones. Other devices are slowly but surely capturing the pocketbooks of consumers, and they promise to do even better in the future. At this point, for example, millions of Americans are

aware of the new cartridge video tape recorders on the market. VTR's use plug-in cartridges, much like eight-track audio tape cartridges, to video tape TV shows for later viewing. Sony Corporation set a blistering advertising pace during 1976 for its Betamax unit, and buyer response substantiated Sony's marketing sagacity.

Video tape recorders have been around a long time, of course, but attempts to sell them to consumers have met with a number of falso starts. Somehow, VTR's never proved to be mass-market items. Sony's Betamax and a competitive unit from JVC might conceivably change matters, however. Prices are still rather high for the general public, but volume production should remedy that situation during the next few years.

Video Disc Systems

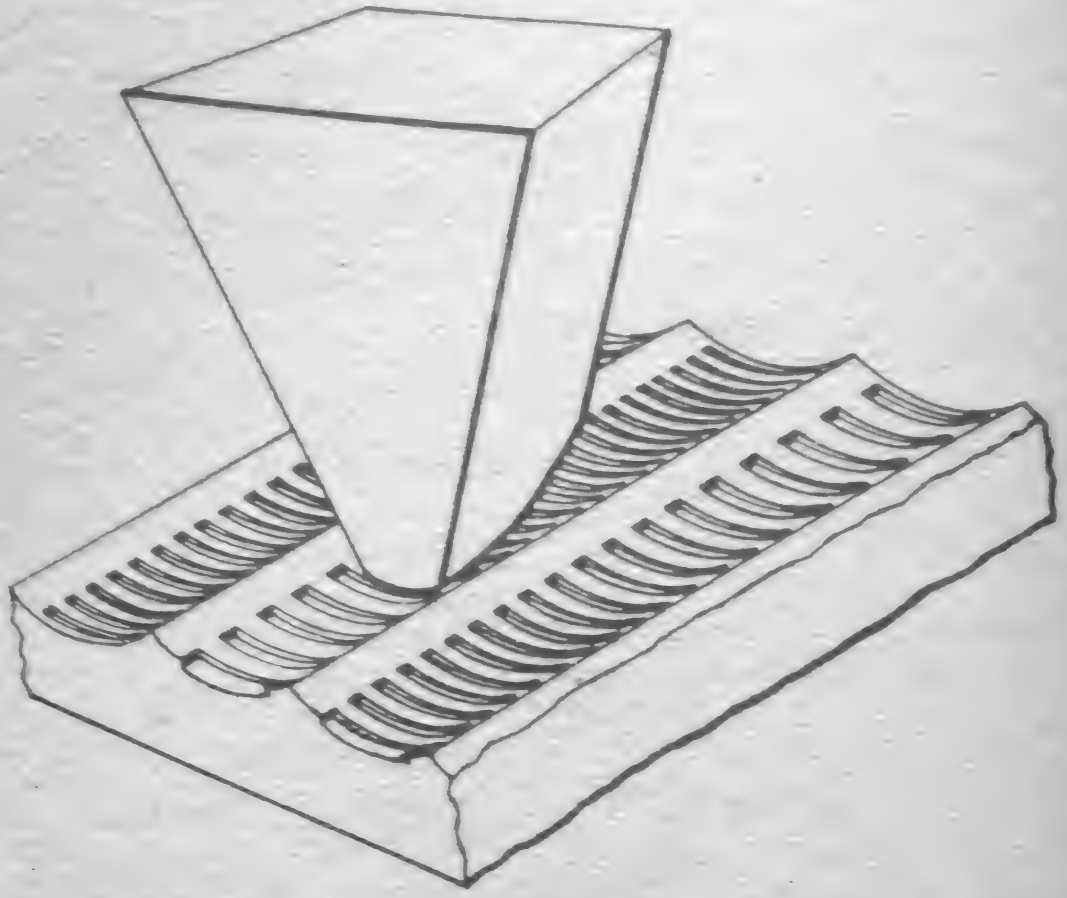
MORE PROMISING are the video disc systems. Expected to reach the consumer market sometime in 1977 after considerable time spent in development, the systems consist of playback records that resemble the oridinary LP discs that one plays on a phonograph. The big difference is that these discs project motion pictures in full color and sound when their electronic impulses are fed to the antenna terminals of any TV receiver. Imagine being able to buy



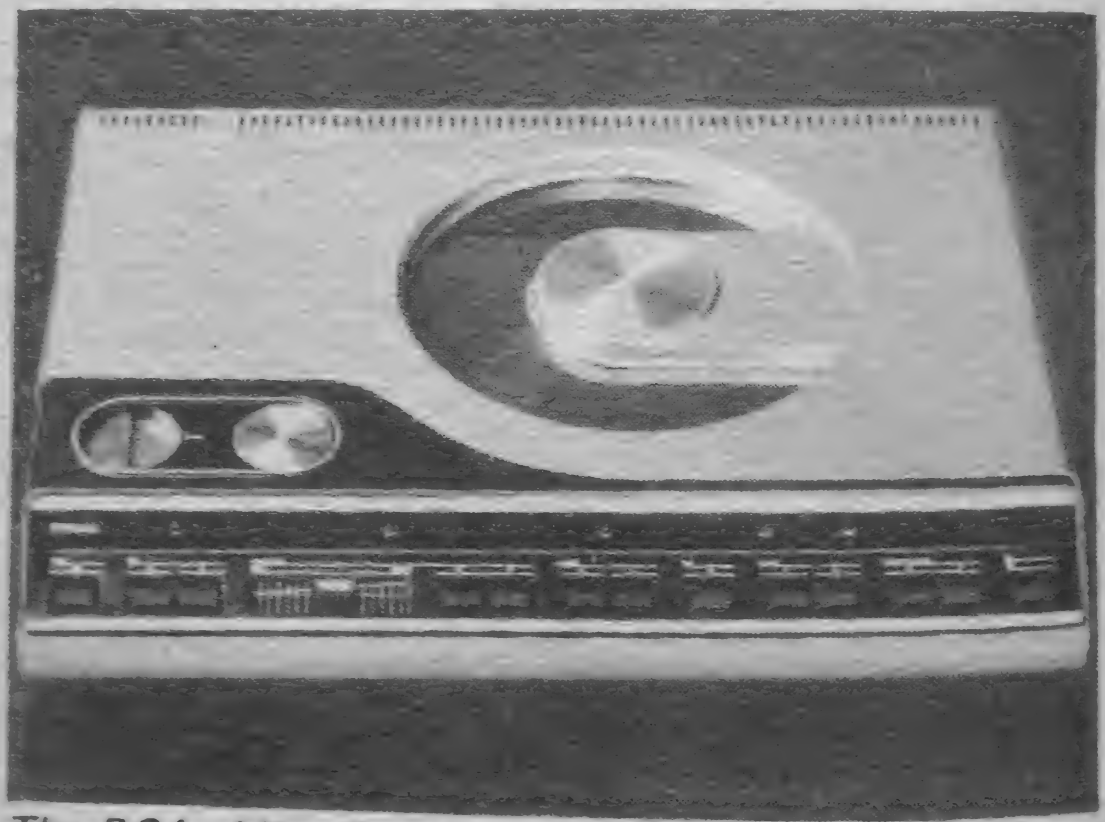
The Philips and MCA Videodisc system employs an optical laser beam to read the disc's groove intelligence and transfer it to the screen of your home TV.

the latest motion picture for say, $10, and have the entire family watch and hear it in the comfort of your living room or den. Then imagine being able to see the movie again whenever you wish, trade discs with other people, and so on.

RCA's Selectavision system plays 12-inch VideoDiscs which create full-color motion pictures on an ordinary color TV set.



RCA's Selectavision system utilizes a truncated stylus to ride atop the record groove.



The RCA video disc player is a simple unit that can be attached to any standard TV set.

Video disc systems, like the one from RCA, allow viewers to watch full-length movies in the comfort of their own living rooms.

Three companies are competing on this exciting consumer product area: Philips (in combination with MCA and Magnavox), RCA, and Telefunken/Decca. The machines are expected to retail somewhere in the area of $500; the video discs are expected to range in price from $2 to $10, depending on content. Playing time for one disc from Philips/MCA is about 30

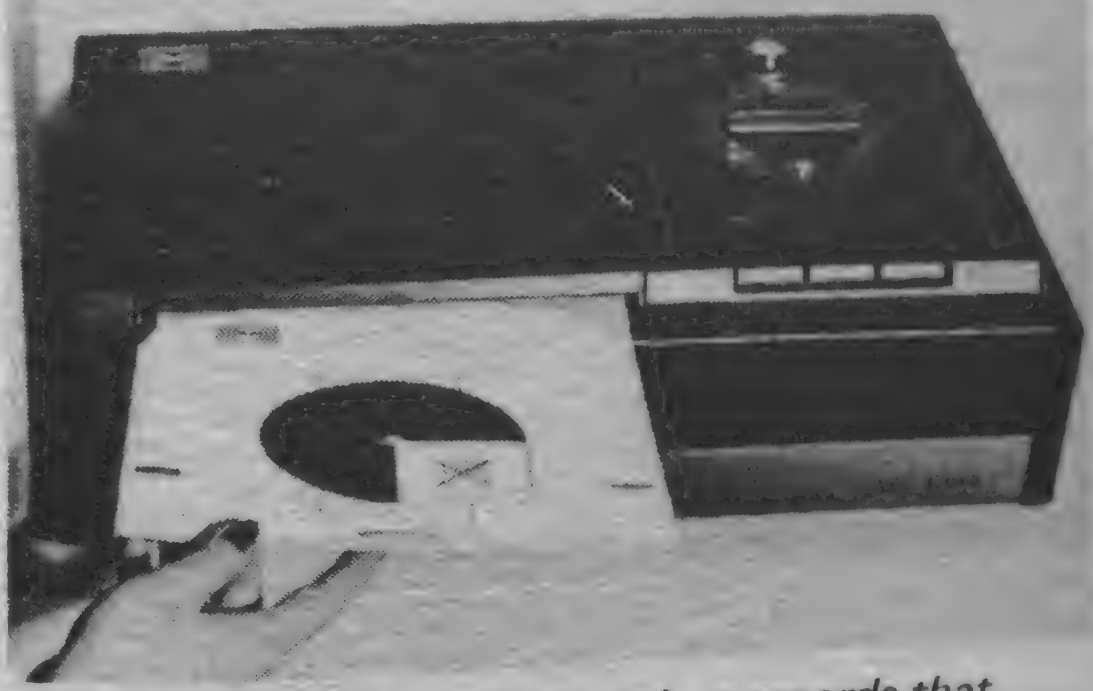
Great opportunities for individualized education are created by the forthcoming disc systems.

minutes; from RCA, 60 minutes (two sides); from TelDec, 10 minutes. How long will a video disc last? RCA says that its disc will play without noticeable degradation for at least 100 hours.

RCA's video disc system is the least

complicated one. It uses a phonograph-like truncated stylus to ride atop video record grooves. The cartridge arm moves across the record in a straight line. The principle of the system rests on the stylus detecting information by capacitance differences generated by information in the disc's groove slots.

The Philips/MCA/Magnavox machine uses a different system based on a no-



The TelDec video disc system plays records that look like the paper-thin discs used in advertisements.

The TelDec video disc system, like RCA's Selecta-vision, uses a stylus that rides on the disc's grooves.

contact-with-the-groove concept. It employs, instead, an optical laser beam to read the video disc groove's intelligence and transfer it to the screen of your home TV set. Since nothing touches this disc, it should last virtually forever.

The TelDec system, like the RCA system, uses a stylus that rides on the disc's grooves. The video disc itself, however, looks like the thin little records sometimes inserted in magazines for advertising purposes.

What kind of movie selection will be available to consumers? MCA's Universal Film Library alone offers more than 11,000 titles from the 1930's to the present day. Warner Brothers, too, has indicated it will release its library of motion pictures in the video disc format. Additionally, there are many educational, cultural, how-to programs etc., that can easily be placed on video discs. You can, for example, simply place a disc on your record player and receive personalized instruction on your TV set regarding how to improve your golf swing, how to cook a special dish, how to play the guitar, and so on. You will even be able to watch and hear a symphony orchestra, a theatrical play, etc.

Slow-Scan Video Systems

THERE ARE OTHER video/audio systems on the market that do not utilize your present TV set. For example, if you are a ham radio enthusiast, you can now communicate over the air with pictures and sound using what is called "slow scan" equipment. You must have a ham license to do this, however. Pictures are revealed by a slow roll down the screen as if a shade were being lowered. Then it starts all over again (the top part begins to fade) in a cycling effect.

If you are a licensed ham radio operator, you can communicate over the air with pictures and sound using what is called slow-scan equipment.

Projection Sets

PROJECTION TV SETS are not new; they were conceived as early as the 1930's. They were never consumer items until quite recently, however. Now, though, they are being sold to more and more people who seemingly are not satisfied with the 25-inch screens commonly available from nearly every television manufacturer. In

fact, more than 50,000 of these costly units were sold prior to 1977.

How do they work? There are three basic systems. One — called "direct projection" — uses a high-brightness picture tube with a projection lens focused on a screen. Another employs a small picture tube with extremely high brightness intensity beamed at a sophisticated optics system — called a Schmidt mirror — that projects the image on a screen. The third system produces an enormous projected picture via a light source, magnetic deflection devices, a fluid surface, and input and output bars. The first two systems are the only ones to make inroads in the consumer marketplace; the last system is too expensive and produces pictures that are actually too large to be utilized in the typical home.

What all these projection systems have in common is an optical system that projects a TV picture onto a large screen that is either part of the system's console or a separate entity altogether. One of the most popular units — Advent Corporation's VideoBeam 750 — uses Schmidt optics and three individual projection picture tubes to produce a picture on a screen that measures 41 by 60 inches. A two-piece set, the Advent 750 projects an image that is about eight times the size of a picture on a 25-inch TV set.

Thus, if big-screen viewing is what you

want, projection sets are definitely the way to go. Some 25 companies are currently in the projection set field.

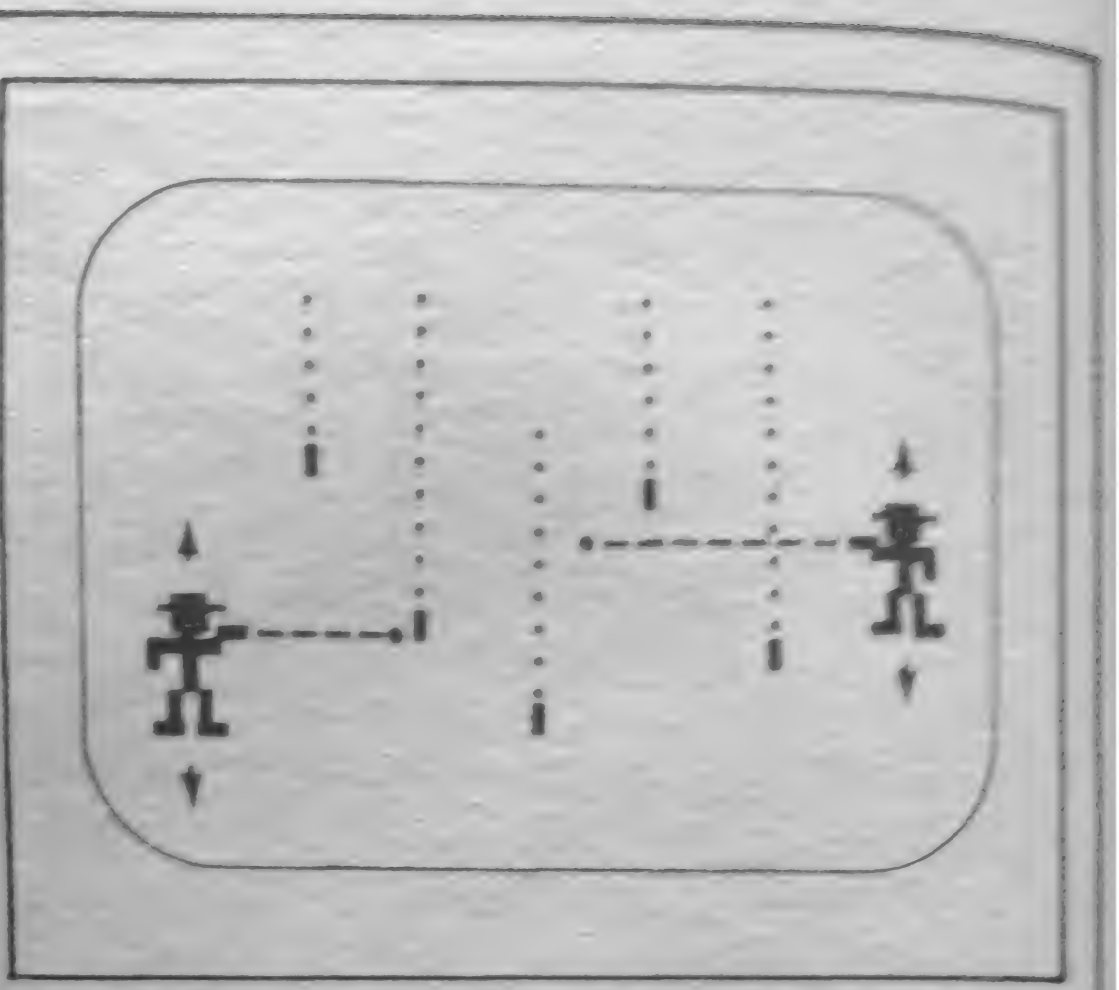
What The Future Holds For Video Games

THERE IS NO doubt within the electronic games industry that everyone's TV set will eventually be transformed into an all-round amusement center. Texas Instruments Inc., for example, has introduced its "Universal Game Circuits" to provide TV games with the variable speed option and horizontal as well as vertical movement. One of the company's chips (TI uses multiple chips instead of single LSI chips for greater flexibility) will create a game called "Quick Draw," in which simulated gunmen shoot at each other. Moving bars act as obstacles to shooting the opposing gunman.

Two separate paths are emerging in the video game business. One path leads to continued use of integrated circuits to produce budget-priced and deluxe units possessing a fixed number of games. The other path leads to expanded use of microprocessors to provide an unlimited variety of add-on games. Fairchild already has its Video Entertainment System on the market. RCA promises to market a microprocessor unit during 1977 and is expected to follow Magnavox's lead in build-

Advent Corporation's VideoBeam 750 produces an image that is about eight times the size of a standard 25-inch TV picture.

ing game units into certain regular TV models. Other manufacturers are sure to follow suit, delivering single-chip, central-processing, eight-bit devices that contain RAM's, ROM's, and input/output. It would



In the Quick Draw game, gunmen shoot at each other.

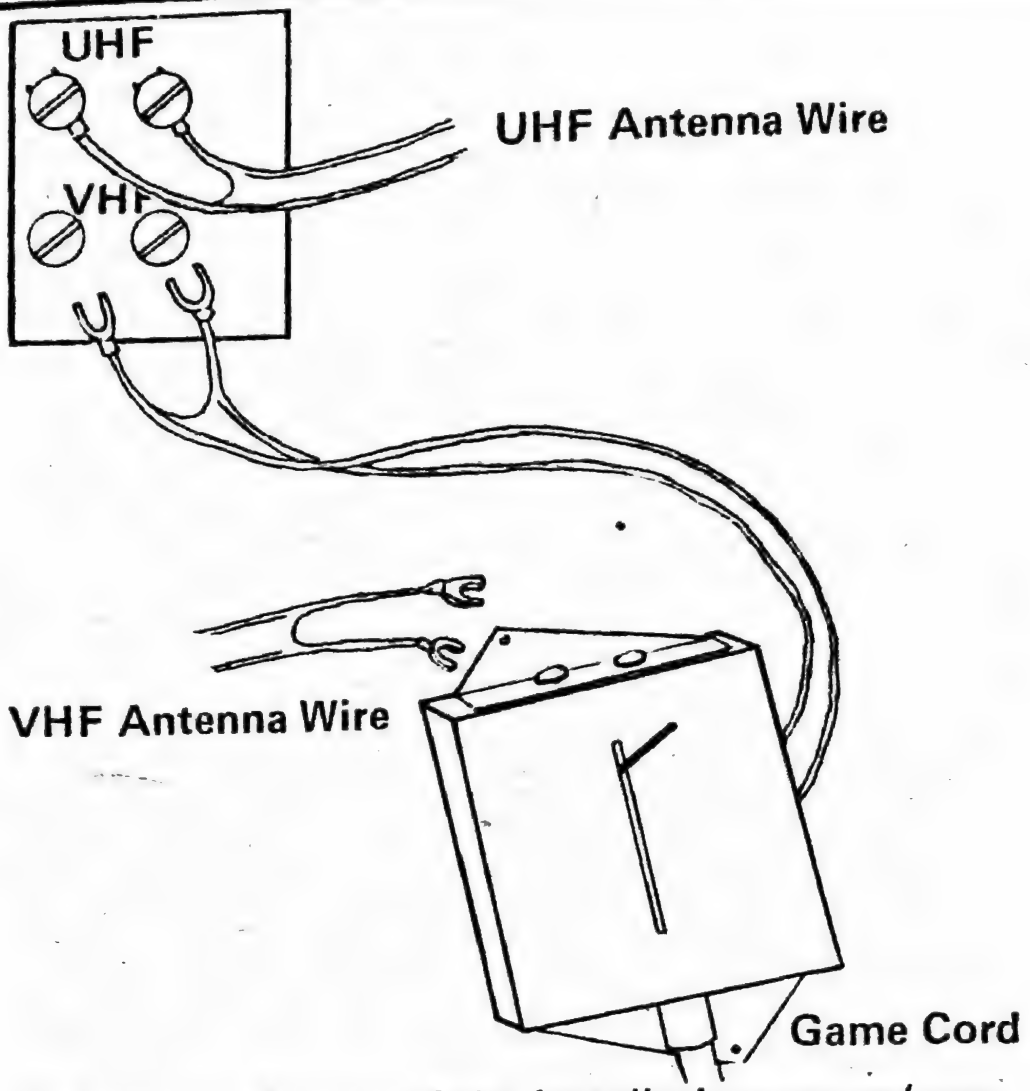
come as no surprise to industry observers it, by 1980, the microprocessor units outsell the game models based on integrated circuits.

And this is not the end of uses and applications to which your television receivers can be put. You will soon be able to play chess, Scrabble, and games of chance against a video machine. Moreover, systems will doubtlessly be introduced in the future allowing a person to program his or her own games. Therefore, expect one day to read the newspaper, examine merchandise from a store, and even earn a college degree by taking lessons that appear on your own television set.

Game Installation, Care, And Maintenance

UNPACK YOUR NEW video game carefully. Many of the units are protected by a formed, foamlike substance into which each end of the game fits. Moreover, since one end generally has a well to hold the game/set switch, never throw out any of the packaging until you account for every part — including the AC adapter, plug-in cables, instruction manual, and warranty card — you are supposed to have.

In setting up your game, the first step is to examine the rear of your television receiver. Most TV sets today have four antenna terminal screws, one pair for VHF channels and one pair for UHF channels. If your set has 300-ohm flat twin-lead an-



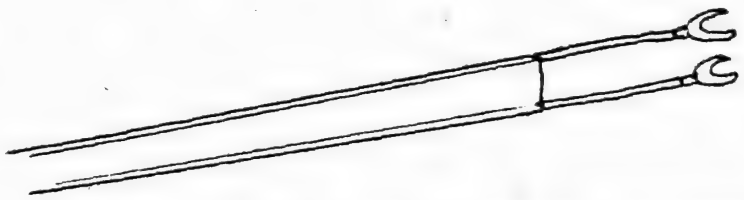
Before you do any of the installation procedures, make certain that your TV is turned off. Then disconnect the TV's antenna wire, connect it to the game switch's terminals, and connect the game switch's wire to the TV antenna terminals.

tenna wire (most people do have this type of antenna wire) attached to the VHF set of screw-type terminals, disconnect the wire and connect it to the game switch's terminals (the only two screws on the switch box) marked "antenna" of "TV set." Then connect the short length of flat TV wire that is permanently affixed to the game switch

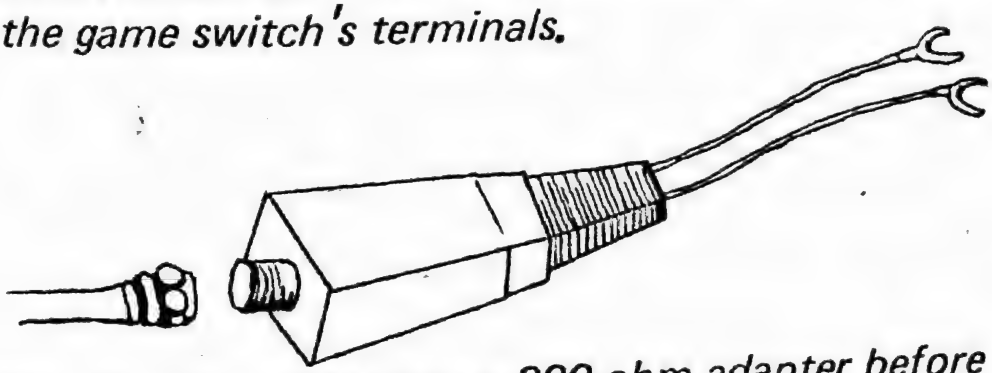
box to the TV set's antenna terminals. All you are really doing is substituting wires.

The next step is to connect the long wire or cable from the game to a phono jack input on the switch box, thereby connecting the switch box to the game.

Depending on your TV set and the game that you buy, you might have to follow a slightly different procedure in order to obtain good, clear reception. You might, for example, have a TV set that has a round, coaxial type of antenna lead. This type of cable (75-ohm) is used primarily when a set is hooked into an apartment building's master antenna system. If this is the case, you need to install a 75-ohm to 300-ohm adapter. The coaxial antenna cable should be screwed into the adapter end, while the other end has the flat 300-ohm cable pro-



You can attach 300-ohm flat twin-lead antenna wire to the game switch's terminals.



Screw 75-ohm cable onto a 300-ohm adapter before making game switch connection.

truding for attachment to the switch box terminals. There are a few games — like National Semiconductor Corporation's Adversary — in which the original antenna lead must be attached directly to the antenna terminals on the game console itself.

The next step is to provide power for the video game. If you have the right AC adapter (not all video games require the same power), plug the cord end into the game jack provided for this purpose and plug the box-like twin-pronged transformer into a standard household electrical outlet. If you decide to use batteries — "C" or "D" cells — insert them according to the polarity requirements marked in the battery area. Be sure to examine the plus and minus positions carefully; the flat bottom of a battery is considered to be the minus side, while the side with the small round protrusion is the plus side.

Now, set the channel switch for the unused channel in your area. In most localities, that would be channel 3, but it might be channel 4. The channel switch is generally located at the bottom of the game console. Sometimes, you have to use a screwdriver to alter an inaccessible channel switch.

After you make all these connections and double check them to be certain they are correct, turn on the TV set and move the game/set switch to the "Game" position.

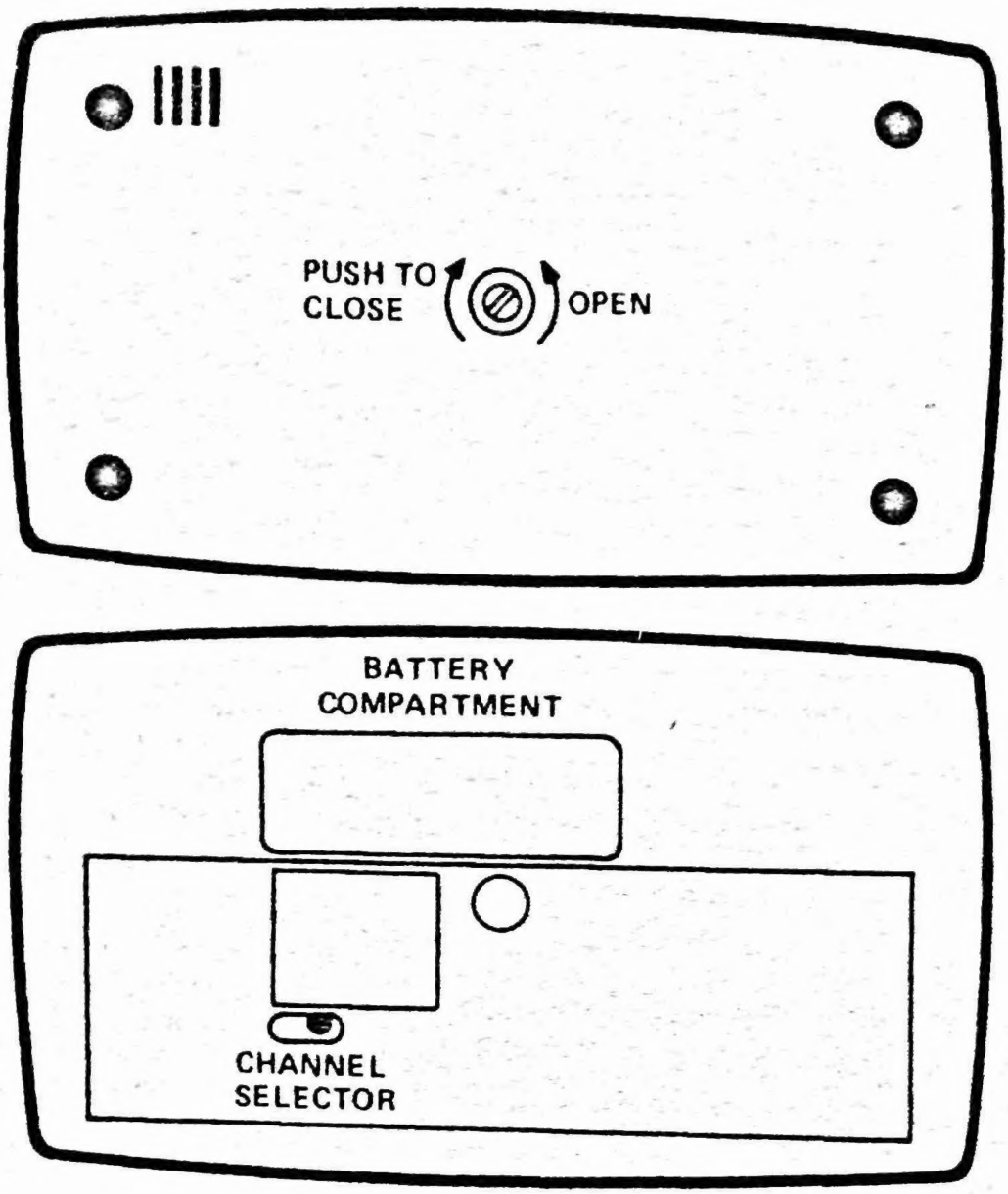
Finally, turn the game's power switch to "On." Now wait a moment to see if you have a good, clear picture of a playing field on the screen.

Adjust the manual VHF fine-tuning control to obtain the best picture you can get. If you have an automatic fine-tuning switch on your TV set, turn it off. You are now sending your own signal to the TV set, just as a broadcast station does.

If you see diagonal stripes on the screen, adjust the horizontal control on the TV set; this external control may be on the front of the set, inside a little trap door, on the back of the set, or on the side. If the picture rolls vertically, adjust your set's vertical hold control. The Magnavox Odyssey 400 game has controls marked "VERT FREQ" and "HORIZ FREQ" in holes at the bottom of the console, but you will need a thin-blade screwdriver to adjust these controls.

If the game display is designed to show color on a color TV set, adjust the set's color and tint controls for the best picture. On any kind of set, of course, you should adjust the brightness and contrast controls as needed. If the game has its own speaker, turn down the volume control on the TV set.

If you fail to obtain a satisfactory picture or get no picture at all, press the game's reset button. If the picture does not improve, follow these quick troubleshooting



Insert batteries according to the polarity requirements indicated.

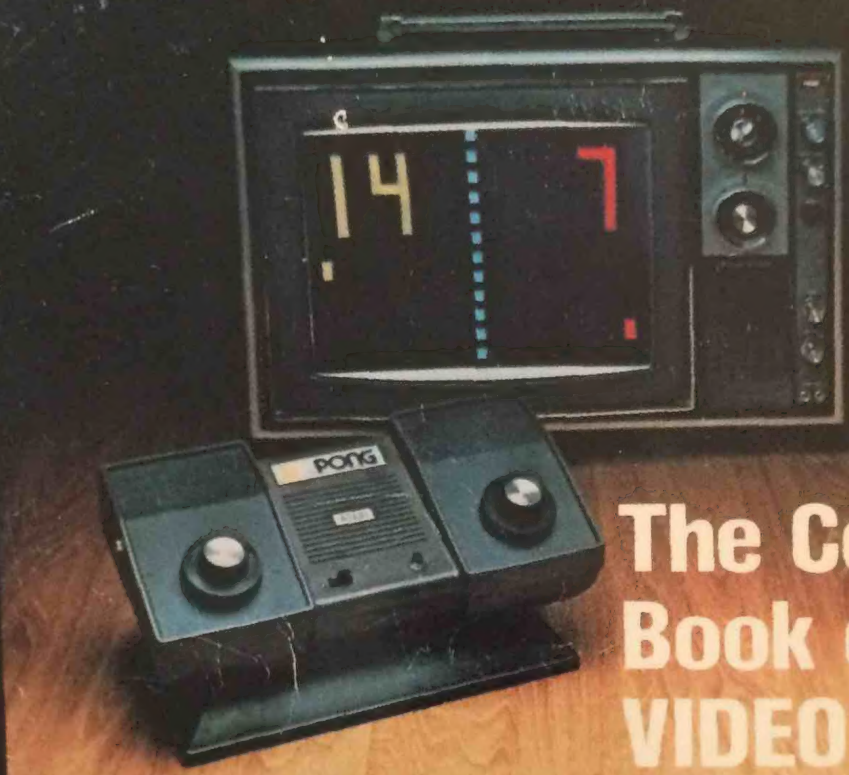
steps. Substitute batteries that you know are fresh for the ones you installed before; also double-check battery polarity. Check the connections, especially the ones on the switch box going to the TV set's antenna terminals. The weight of the switch box sometimes causes one of the antenna leads to pull off. To be sure that the fault does not lie with the TV set itself, switch to

a regular TV viewing channel after moving the game switch to the TV set position. Then switch back to the game position.

With some games, the display will not be centered properly. You can try adjusting the horizontal hold and vertical hold controls, but there may not be enough leeway to center the playing field sufficiently. So long as the court is entirely visible you have nothing to worry about, but if part of the court is off screen, you obviously must take some corrective action. If your TV set has a horizontal centering control at the rear, you can often solve the problem; just make sure that the control change does not foul up your viewing of regular broadcast programs. The same holds true for adjustment of the vertical size and height controls. If none of these control adjustments provide you with an image of an entire playing field, take the game back to your dealer immediately for an exchange.

To preserve your video game, be sure to remove the batteries whenever you know that you will not use the game for an extended period of time — say, for a month or longer.

Skeet-shoot! Play tennis! Hockey! Handball! ALL ON YOUR OWN TV SET



The Complete Book of VIDEO GAMES

- **All the games you can play** from paddleball to squash.
- **Which games are best to buy** with expert evaluation of quality vs. price from among the many games available.
- **How to play to win**—the techniques and strategies of each game.
- **How to choose games to fit your family**—which are best for children or for adults and how many people can play.
- **How to use TV games as learning tools** to develop your knowledge of sports and practice techniques that can be used on the actual courts.
- **What special TV attachments** are available now and what new devices are coming, such as video-disc machines that can show entire movies on your TV screen.

Get in on this exciting new home entertainment! Enjoy it more with the expert advice of the editors of CONSUMER GUIDE.®